

U.S. Army Corps of Engineers New England District

FINAL
REMEDIAL INVESTIGATION REPORT
AREA OF CONTAMINATION (AOC) 57

VOLUME III OF III APPENDICES E THROUGH Q

CONTRACT DACA-31-94-D-0061 DELIVERY ORDER NUMBER 0001

U.S. ARMY CORPS OF ENGINEERS NEW ENGLAND DISTRICT CONCORD, MASSACHUSETTS

JUNE 2000

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Prepared for:

U.S. Army Corps of Engineers New England District Concord, Massachusetts

Prepared by:

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Portland, ME
Project No. 45001
Task No. 0914403

June 2000

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AOC 57 AND LOWER COLD SPRING BROOK HISTORICAL SURFACE WATER AND SEDIMENT ANALYTICAL DATA

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STORM DRAIN SYSTEMS NO. 1/2 AND ASSOCIATED LOWER COLD SPRING BROOK ANALYTICAL SEDIMENT SAMPLE RESULTS

	DITCHS	H SAMPLE LOCATIONS	TIONS	100	D SPRING BI	KOOK SA	COLD SPRING BROOK SAMPLE LOCATIONS	NS	
				UPSTREAM			DOWNSTREAM		
	SSD-93-01B	CSD-94-29X	CSD-94-30X	CSD-94-31X	CSD-94-32X	-	CSD-94-33X	3	CSD-94-34X
	08/17/93	09/21/94	18/17/0	09/21/94	18/21/94 17/0	•	09/21/94	•	09/21/94 0 FT
	7.10			4					
PAL METALS (pg/g)	9620	9430	7700	16700	8	S010	9320		2790
Arenic	15.5	16	23.3	14.6		11.4	5.87		25
Berlin	27.1	32.4	33.2	91.2		39.8	60.4		42.7
Bervillum	QX	QN	QX	> 0.5	v	0.5		٧	0.5
Cadmium	< 12	1.63	< 0.7	2		- 2	S		Q.
Calcium		820	2470	3260	~	2410	1600		2340
Chromina	24.5	32.2	15.9	34.9		11.7	20.7	v	4.05
Cobalt	4.7	5.99	6.54	8.04		5.66	4.87		9.94
Conner	44.5	46.7	15.9	6:39	_	98.	3.17		13.9
Lon	16700	13000	10400	12300	•	0220	7300		9740
2007	4	78.7	43	15.5		23.5	6.92		25
Memorium	4470	4590	2220	3500	_	1430	2410		1710
Menenses	203	259	77.2	759		891	597		358
Manigarese	0.192	0.05	0.00	Q		S	QN.		QX
Nickel	188			25		10.4	14.3		15.7
Dotaceinm	1700	1400	641	227	v	81	355	٧	901
Celentim	QX	Q	QZ	127		6:0	0.993		1.44
Sodium	26.6	519	1000	1330		891	796		1300
Vanadium	18.4	21.7	18.5	15.2	v	3.39	8.74		14.5
Zinc	67.0	53.9	83.5	33.2		7.6	20.3		83.6
PAT SPMIVOLATITE ORGANICS (446/8)									
2 methyhanhthalene	0.21	< 22	- 1	Q.		QN.	QN		QN
9h-carthazole	Ð	QN	QX	A GNI.	_	IND R	IND R		IND R
Accomptiviene	5.8		< 0.7	< 0.033	v	03	0.033	٧	0.3
Anthracene	7.1	7	< 0.7	0.33	v	0.3	_	v	0.3
Benzo (a) Anthracene	51	∞	3	< 0.17	v			٧	7
Benzo (a) Pyrene	8.4	• 10	۸ م		v	7		v	7
Benzo (b) Fluoranthene	11	• 10	*		v			٧	7
Benzo [g.h.i] Perylene	11		۸ م		v			v	7
Benzo [k] Fhoranthene	6.3			_	v	0.7	_	v	0.7
Bis(2-ethylbexyl) Phthalate	QN	2	QN .	> 0.62	v	<u>v</u>		٧	9
Chrysene	4	10	2 ~		٧			٧	
Fluoranthene	30	01	9	0.62					က
Fluorene	2.3	2 >	< 0.7	< 0.033	v	0.3		٧	0.3
Indeno [1,2,3-c,d] Pyrene	8.9	. 10	9		v			v	က
Phenanthrene	30	4 (en t	0.25	v	0.3		٧	0.3
Pyrene	30	2	1	. 0.47		1	0.033		7

UPSTREAM			DOV	DOWNSTREAM		
CSD-94-31X 0971/94 0 FT	ਹ ਹ	CSD-94-32X 09/21/94 0 FT	83	CSD-94-33X 09/21/94 0 FT		CSD-94-34X 09/21/94 0 FT
16700	L	\$010		9320	L	5790
14.6		11.4		5.87		23
91.2		39.8		60.4		42.7
> 0.5	٧	0.5	٧	0.5	٧	0.5
		QX		QN		QX
3260	_	2410		1600		2340
34.9		11.7		20.7	٧	4.05
8.04		5.66		4.87		9.94
6:39		6.86		3.17		13.9
12300		6770		7300		9740
15.5		23.5		6.92		25
3500		1430		2410		1710
759		891		597		358
Q		Q		N		QX
25		10.4		14.3		15.7
LLS.	٧	100		355	٧	100
127		6.0		0.993		1.44
1330		891		796		1300
15.2	٧	3.39		8.74		14.5
33.2		39.7		20.3		83.6
QN	L	QN		QN	L	QZ
A CNI.		IND R		IND R		IND R
< 0.033	٧	0.3	٧	0.033	٧	0.3
0.33	٧	0.3	٧	0.033	٧	0.3
< 0.17	٧	7	٧	0.17	٧	7
< 0.25	٧	7	٧	0.25	٧	7
< 0.21	٧	2	v	0.21	٧	7
< 0.25	٧	7	٧	0.25	٧	2
0	٧	0.7	٧	990'0	٧	0.7
< 0.62	٧	9	v	0.62	٧	9
< 0.12	٧	-	٧	0.12	٧	-
0.62		7	٧	9900		ဇ
0	٧	0.3	٧	0.033	٧	0.3
< 0.29	٧	6	٧	0.29	٧	3
0.25	٧	0.3	v	0.033	٧	0.3
			-			

o:V6Shisaechables/fdfs/csb/4-2.wk1

STORM DRAIN SYSTEMS NO. 1/2 AND ASSOCIATED LOWER COLD SPRING BROOK ANALYTICAL SEDIMENT SAMPLE RESULTS

LOWER COLD SPRING BROOK SITE INVESTIGATION FORT DEVENS, MA.

		DITCH SAMPLE LOCATIONS	NS S	Tioo Con	SPR	COLD SPRING BROOK SAMPL	IMY
				UPSTREAM	L		DOM
	SSD-93-01B 08/17/93	CSD-94-29X 09/21/94	CSD-94-30X 992194	CSD-94-31X 09/21/94	٥	CSD-94-32X 092194	8
	0 FT	0 FT	0 FT	OFF		P P	
PAL PESTICIDES/PCBS (4e/e)			•				
DDT	Ϋ́	WA.	AN.	Y.	٧	0.00707 M	
ada	Ϋ́	NA.	NA AN	AN.		0.024 C	
DDB	Ϋ́Χ	AN	Ϋ́	Y.	٧	0.00765	
Deldrin	Ϋ́	- AN	Ϋ́	Y.	٧	0.00629 M	
Endosulfan Sulfate	4 2	NA AN	NA NA	AN AN	٧	0.00763	
gamma-chlordane	AN	AN	NA	33ND R	\perp	3ND R	
OTHER (42/g)							
Total Organic Carbon	30000	32500	58400	67400		42400	
Total Petroleum Hydrocarbons	240	281	239	< 282	_	71.9	
NOTES:							

	CSD-94-34X 09/21/94 0 FT	0.00707 M	0.0537 C	0.00765	0.00629 M	0.00763	3ND R	_	64700	110
	CSD-94- 61760 0 FT	v	-	°	0 v	0 v				
CSD-94-33X	140 0 FT	V.	¥X	AN AN	XX	¥X	.33ND R		24600	55.1
X28	OFT	0.00707 M	0.024 C	0.00765	0.00629 M	0.00763	3ND R		42400	71.9
Ø		v		٧	٧	v				
CSD-94-31X 092184	OFI	AN	ĄZ	Ϋ́Х	٧×	Ϋ́	33ND R		67400	282
೮										v

R = Non-target compound analyzed for but not detected.

M = Duplicate high spike analysis, not within centrol limits.

C = Analysis was confirmed.

NA = Not analyzed

ND = Not detectable

µg/g = micrograms/gram

STORM DRAIN SYSTEMS NO. 2/3/4 AND ASSOCIATED LOWER COLD SPRING BROOK ANALYTICAL SEDIMENT SAMPLE RESULTS

			DITCH SAM	DITCH SAMPLE LOCATIONS		
	med ed the	Acc on these	A16 70 Cau	776 10 CED	ALCTO USU	X36-04-05X
	SSD93-03B	X7-X-00 -	A12=M=/15	A12-14-16.	463-146-169	V67 - 100
ANALYTE	08/11/93	602024	+6/07/60	09/20/94	+6/02/60	16/m/34
	0 FT	THO .	HO	0 FT	GFI	I A A
(-)/ 314 T-154 TAG						
	0380	0009	7840	29500	2000	14000
Auminum	19.6	1.09	10.6	18.8	> 1.09	3.48
Antimony			18	9	8.55	19
Arsenc	46.2	12.7	30.9	155	15.9	63.9
	S	£	2	QX	Ð	£
Beryllium	3.74	0.947	2.18	27.7	< 0.7	6.35
Caomium	2240	3850	1140	3440	989	2040
Caroum	38.4	23.5	39.5	142	19.7	57.2
Cironium	ec	3.86	5.83	15.7	3.91	10.6
Coorii	43.9	13.4	36.1	145	12.2	49
Copper	21900	12100	14300	42400	11100	20900
TOIL TOIL	230	18	137	410	34.8	166
Tread	4200	2020	3910	14900	2430	9969
Magnesium	225	231	174	551	172	423
Manganese	0.0751	v 0.05	> 0.05	> 0.05	> 0.05	> 0.05
Mercury	22.3	18.3	22.7	82.1	15	38.3
Detail	1140	552	1040	4610	583	1860
S-f-min-	æ	2	æ	æ	æ	2
Selium	108	327	264	1650	412	840
Vanadium	28.2	19.6	24	91.4	14.2	39.5
Zirc	171	46.9	115	573	41	184
(7/**) SJIN V JOO O HELV LOSSIFICATION AND AND AND AND AND AND AND AND AND AN						
PAL SEMIVOLATILE ONORMICS (PER)	2.1	1	<	< 5	< 0.5	< 2
	0.35	90	9:0	3	0.3	
Z-meinylphenol/Z-cresol	22	× ×			2	01
4-memyiphenol/4-cresor	2	2	2	£	S	2
Acenanithene	3.6	-		^ 4	0.4	2
Accomplished	30	< 0.7	< 0.7	۵,	0.3	2
Anthracene	30	7		3	9:0	2
Demo (a) Anglicacente	9	9	•	> 20	7	
Delizo [a] futunacene	8	۰ ۲	10		2	o2
Benzo [h] Filoranthene	9	10	8		9	
Benzo [g.h.i] Perviene	30	۸ م	۸ ۸	07	2 >	
Benzo [k] Fluoranthene	92	2	9		-	
Bis(2-ethylhexyl) Phthalate	S	2	E '	_	& `	4
Chrysene	8 ;	- 10	01	2	•	• ;
Dibenz [a,h] Anthracene	1./	*	*		7	

9-20-50

STORM DRAIN SYSTEMS NO. 2/3/4 AND ASSOCIATED LOWER COLD SPRING BROOK ANALYTICAL SEDIMENT SAMPLE RESULTS

ANALYTB	SSD-93-03B 08/17/93	CSD-94-22X 09/20/94	CSD-94-21X 09/20/94	CSD-94-24X 09/20/94 n PT	CSD-94-23X 09/20/94 0 FT		CSD-94-25X 09/20/94 0 FT
	TAN		200	7	> 0.4	v	2
Dibenzofuran	9.7	- 92	, 8 ,	8	••		20
Fluoranthene		2	0.7	۰ ۲	< 0.3	V	7
Fluorene	5	2	2	R	£		2
Indeno [1,2,3-c,d] Pyrene	9.6	0.7	< 0.7	*	× 0.4	٧	7
Naphthalene	25		9	70	~		7
Phenanthrene	700	20 2	202	07	7	_	20
ryreine				i			
PAI. VOLATILE ORGANICS (#Z/R)						-	42
	2	٧z	₹z	¥z	∀ Z	_	₹
I, I, I - Urchioroculane	Ę	¥	NA AN	NA NA	¥		¥
Acetone	<u> </u>	X	¥Z	NA NA	YZ		٧X
Toluene	700	X	¥Z.	AN	AN		¥
Tetrachloroethylene / Letrachloroethene	2	Y.	Y.	NA	NA	-	AN
1 renotonuoromene				1			
OTHER (µg/R)			0000	00073	2077	-	64600
Total Organic Carbon	00099	2320	14/00	000461	363		1220
	1200	625	2500	2490	023		1220

STORM DRAIN SYSTEMS NO. 2/3/4 AND ASSOCIATED LOWER COLD SPRING BROOK ANALYTICAL SEDIMENT SAMPLE RESULTS

			COLD SPR	COLD SPRING BROOK SAMPLE LOCATIONS	SAMPLE L	OCATIONS		
		UPSTREAM	EAM			DOWNSTREAM	REAM	
	G3D	G3D-92-03X	35	CSD-94-27X	ers	57D-92-02X 08/19/02	<u>ფ</u>	CSD-94-28X 1972/94
ANALYTB	8 -	0 FT	•	0 FT	•	0 FT		0 FT
DAT MOTAL 6 ((.)								
Alminim		12500		6190		NA		3410
Antimony		2		R		YN.		S
American		€ 95.2		9.37		Ϋ́		7.65
Redim		127		35.3		Ϋ́		23.3
Description	v	0.5	٧	0.5		Ą	v	0.5
Cadmin		£		Ð		Y Y		Ş
		5810		1810		Ϋ́		868
Chromitim	<u>v</u>	4.05		14.9		Ϋ́		8.5
	~	1.42		7.86		Y.		6.52
Coorii		409		7.83		Y.		4.14
		15900		9290		¥X		4800
Iron		350		8.17		NA		10.2
Lead		4610		2050		Y.		1340
Magnesium		330		524		Y'X		242
Manganese		Ę		£		Y.		S
Mercury		4	_	13.2		Y.		8.67
Nickel		1520		308		Y.		173
Potassium	~	0.25	v	0.25		¥	v	0.25
		2120		707	.,-	NA		516
Sodium		72.5		8.45		N A	٧	3.39
Vanadium		372		31.4		A'A		32.1
3417								
PAL SEMIVOLATILE ORGANICS (µg/g)								
2-methylnaphthalene		2		2		£		Q
2-methylphenol /2-cresol		£		£		2		£
4-methylphenol / 4-cresol		Ð		£		웊		2
4-mountings	_	4.68 S		IND R		.033ND R		ONI.
Acenanhthene		Z		£		윤		S
Acenaphthylene		4.37	v	0.033		0.075	v	0.033
Anthracene		4.42	٧	0.033		0.1	v	0.033
Renzo (s.) Anthracene		18.1	٧	0.17		0.35		0.27
Benzo [a] Purene		22.9	٧	0.25		0.51	v	0.25
Benzo [a] spend		32.7	v	0.21		19.0	v	0.21
Benzo (a h il Perviene		18.9	٧	0.25		0.34	v	0.25
Bonzo [k] Fluoranthene		33.2	٧	990'0		0.47	v	0.066
Disco (n.) 1 incluing in the late	_	3.1		1.5	v	0.62	v	0.62
Dis(s = culyment) 1 immune Charene		47.1	٧	0.12		0.8		0.67
Cillysone		Ę		Q		Ş		Ş

STORM DRAIN SYSTEMS NO. 23/4 AND ASSOCIATED LOWER COLD SPRING BROOK ANALYTICAL SEDIMENT SAMPLE RESULTS

LOWER COLD SPRING BROOK SITE INVESTIGATION FORT DEVENS, MA.

)	COLD SP	RING BROOK SA	COLD SPRING BROOK SAMPLE LOCATIONS	
	UPSTREAM	EAM		DOWNSTREAM	REAM
ANALYTB	G3D-92-03X 06/23/92 0 ET		CSD-94-27X 09/20/94 0 FT	STD-92-02X 08/19/92 0 FT	CSD-94-28X 09/22/94 0 FT
*			EX.	SE SE	Z
Dibenzoturan	59.4	v	0.068	4:1	-
Fluoranthene	2010	· v	0.033	0.086	V 0.00
riuorene 		· v	0.29	0.33	< 0.29
Indeno (1,4,5 = c,a) ryrene	- -		£	æ	z
Naphthalene	19.8	<u> </u>	0.033	0.78	0.39
Prenantirene	53.1	v	0.033	1.3	1.1
Little					
PAL VOLATILE ORGANICS (ME)	0.0044		AN	NA	NA
1,1,1 ~ trichloroethane			Y.	₹Z	- AN
Acetone	•		N.	AN	- NA
Toluene			V.	Ϋ́	AN NA
Tetrachloroethylene / Letrachloroethene	00000		Ϋ́	NA	AN
Tremorousemans					
PAI. PRSTICIDES/PCBS (ug/l)					
north distribution of the second of the seco	AN	٧	0.00707 M	Ϋ́Z	¥z.
	₹Z	٧	0.00826	٧X	AN AN
	Ą.	<u> </u>	0.00765	٧X	NA
DDE	₹Z	v	0.00629 M	٧Z	- NA
	₹ Z	v	0.00763	٧×	
Endosullan Sullauc	2ND R		33ND R	33ND R	33ND R
Sening Circles					
OTHER (µg/g)	20000		27500	24400	00261
Total Organic Carbon	219000	٧	28	92.6	47.3
Total Petroleum Hydrocarbons					

M = Duplicate high spike analysis, not within control limits.
 R = Non-target compound analyzed for but not detected.
 S = Non-target compound analyzed for and detected.

NA = Not analyzed ND = Not detectable

µg/g = micrograms per gram

BOWERS BROOK AND ASSOCIATED LOWER COLD SPRING BROOK ANALYTICAL SEDIMENT SAMPLE RESULTS

LOWER COLD SPRING BROOK SITE INVESTIGATION FORT DEVENS, MA.

	 ************************************	VERS BROOK LE LOCATION
		SD-94-16X
ANALYTE		09/22/94
		OFT
PAL INORGANICS (µg/g)		
Aluminum		7550
Arsenic		57.9
Barium		65.4
Beryllium	<	0.5
Calcium		3060
Chromium	<	4.05
Cobalt	l	23.4
Copper		20.8
Iron		11800
Lead	Ī	89
Magnesium	l	2070
Manganese Nickel	l	1140
Potassium	۱ ا	22.6 100
Selenium	< <	0.25
Sodium	l `	0.25 2570
Vanadium	<	3.39
Zinc	1	147
		
PAL SEMIVOLATILE ORGANICS 9h-carbazole	·	43 TD D
Acenaphthylene		.1ND R 0.033
Anthracene	<	0.033
Benzo [a] Anthracene	~	0.033
Benzo [a] Pyrene	~	0.25
Benzo [b] Fluoranthene	Z	0.21
Benzo [g,h,i] Perylene	<	0.25
Benzo [k] Fluoranthene		1.1
Bis (2-ethylhexyl) Phthalate	<	0.62
Chrysene	1	1.3
Fluoranthene	1	1.6
Fluorene	<	0.033
Indeno [1,2,3-c,d] Pyrene	<	0.29
Phenanthrene	l	1.1
Pyrene	1	2.6
PAL VOLATILE ORGANICS (μg/g)		
1,1,1-trichloroethane	1	NA NA
Acetone Toluene	1	NA NA
Trichlorofluoromethane	I	NA NA
		- V6 E
PAL PESTICIDES/PCBS (µg/g)	γ	374
DDT DDD	I	NA NA
DDE		NA NA
Dieldrin		NA NA
Endosulfan Sulfate		NA NA
gamma-chlordane	<u></u>	.33ND R
OTHER		
Total Organic Carbon	1	104000
Total Petroleum Hydrocarbons	<u> </u>	192
NOTES:		

CO	LD SPRIN	G BF	ROOK SAMPLE	LOC	ATIONS
UPST	REAM		DOWNST	REAL	VI
G3D-	-92-02X		SD-94-18X	····C	SD-94-26X
06/	2 4/92		09/22/94		09/20/94
0	FT		OFT		OFT
<u> </u>	12800		8910		7860
	96				
	96 188	l	63 97.3		7.79
_	0.5	_	97.3 0.5		39.1
<		<	3150	<	0.5
_	17000				1400
<	4.05	<	4.05		19.8
	19	l	36		6
	54.9		21.8		2.34
	23200		24400		6820
	220		67		6.9
	3210		2360		2140
	3150		1360		275
l	41.5		26.4		12.9
l	1130		555		294
	2.89	<	0.25	<	0.25
Į.	1620	1	1730		692
	41.4		23.9		10.9
	398	<u> </u>	193	L	19.9
ŀ					
	.165ND R		5ND R		.1ND R
<	0.165	<	0.2	<	0.033
<	0.165	<	0.2	<	0.033
<	0.8	<	0.8	<	0.17
<	1.25	<	1	<	0.25
<	1.05	<	1	<	0.21
<	1.25	<	1	<	0.25
<	0.33	<	0.3	<	0.066
<	3.1	<	3	<	0.62
<	0.6	<	0.6	<	0.12
	4.5	<	0.3	<	0.068
<	0.165	<	0.2	<	0.033
<	1.45	<	1	<	0.29
l	2.22	<	0.2	<	0.033
J	4.59	<u></u>	1	<	0.033
				,	
<	0.0044		NA		NA
	0.49	1	NA		NA
 <	0.00078		NA		NA
<	0.0059	<u> </u>	NA NA	<u> </u>	NA NA
	NA	<	0.00707 M	I	NA
1	NA		0.0498 C	1	NA
1	NA	<	0.00765		NA
	NA	<	0.00629 M	1	NA
	NA	<	0.00763		NA
L	2ND R	L	2ND R		.33ND R
			-		
	166000	1.	113000		18500
<u> </u>	312	L	203	<	28.2

M = Duplicate high spike analysis, not within control limits.
C = Analysis was confirmed.

R = Non-target compound analyzed for but not detected.

NA = Not analyzed

ND = Not Detected

ug/g = micrograms per gram

STUDY AREA 57 MARSH AND ASSOCIATED LOWER COLD SPRING BROOK ANALYTICAL SEDIMENT SAMPLE RESULTS

	CSD-94-20X	CSD-94-20X	CSD-94-14X	CSD-94-35X	CSD-94-17X
ANALYTB	09/22/94 0 FT	09/22/94 0 FT (dup)	09/22/94 0 FT	09/22/84 0 FT	09/22/94 0 FT
/// OINTERN TAR					
TAL MEIALS (ME)	20200	21600 D	8820	8540	5160
Aluminum	21	22.3 D	11.5	26.7	26
Arsenc	78.8	84.2 D	> 5.18	74.3	37.1
Danum	2	QZ.	£	2	æ
Desymmetry Control of the Control of	2.96	3 D	< 0.7	< 0.7	> 0.7
Catalitan	2840	4890 ID	10800	13000	4140
Caronin	53.2	S6.7 D	< 4.05	31.6	14.6
	9.12	10.4 D	< 1.42	8.41	5.15
Connec	39.2	44.2 D	93	44.6	16.2
Copper	21600	22800 D	\$790	12100	7560
1011	222	248 D	240	120	98
Venedim	5340	2690 D	1610	2470	1590
Manage	161	174 D	41.7	592	473
Mangaires	33.8	37.2 D		22	15.3
	1620	1600 D	- 100 - 100	263	427
Selenium Selenium	0.925	0.924 D	9.46	2.61	1.17
Softim	819	984 D	2930	2210	1020
Venedim	38.4	41.2 D	3.39	23.1	16.9
Zinc	160	176 D	176	209	124
PAL SEMIVOLATILE ORGANICS (#88)	5	S C	QX	QN	QN
yn-carbazole	Ş	2	£	£	2
Acenaphiniyene	2	£	R	£	Q
Fallin accire. Renzo [s] Anthracene	£	2	Q	£	2
Donne (a) Directo	2	S S	QZ	Q.	æ
Beizo [a] tyreic	Q.	Q	Q.	£	QN
Renzo (g.h.il Pervlene	QZ.	Ð	2	2	2
Benzo [k] Fluoranthene	ν. •	3 D	< 0.7	< 0.7	- !
Bis (2 - ethylhexyl) Phthalate	QN.	E	2		S.
Chrysene	v	α ₉ ×	~	- ; -	(
	_				•

06-Dec-95

STUDY AREA 57 MARSH AND ASSOCIATED LOWER COLD SPRING BROOK ANALYTICAL SEDIMENT SAMPLE RESULTS

CSD-9420X 0,FT 0,FT ND ND ND Coult one than e CIDES/PCBS (µg/g) ND COURT one than e CIDES/PCBS (µg/g) ND Oxidiate		(SD-94-14X 09/22/94 0 FT ND ND 03 03 03 03 035	CSD-94-35X 09/12/94 0 FT ND ND ND ND ND ND ND ND ND ND	OFT ND
ND ND ND ND ND ND ND ND	ND ND 0.8 < C C C C C C C C C C C C C C C C C C			
nthrene 0.8 nthrene 0.8 nthrene 0.8 VOLATILE ORGANICS (#g/g) ND richlorocthane 0.0016 orofluoromethane 0.0016 PESTICIDES/PCBS (#g/g) 0.083 CM orofluoromethane 0.013 CS chlordane 0.0276 CS a-chlordane 0.0276 CS	v v v			
nthrene vol.ATII.E ORGANICS (µg/g) vol.ATII.E ORGANICS (µg/g) rtchloroethane ne 0.0016 0.003 orofluoromethane PESTICIDES/PCBS (µg/g) chlordane 0.013 CS 0.028 CM nulfan Sulfate 0.0276 CS 0.0276 CS	vv			
VOLATILE ORGANICS (μg/g) -trichloroethane orofluoromethane prestrictides/PCBS (μg/g) chlordane outhordane	v	ND ND NO		
VOLATILE ORGANICS (μg/g) -trichloroethane ne orofluoromethane PESTICIDES/PCBS (μg/g) chlordane nulfan Sulfate 0.083 CM 0.083 CM 0.094 C 0.093 CM 0.093 CM 0.013 CS 0.014 CS 0.015 CS	v	ND > 0.0017 > 0.35	ND 11.0	
PESTICIDES/PCBS (#g/g) PESTICIDES/PCBS (#g/g) Chlordane OUGH O	v	ND > 0.017 > 0.0078 > 0.35	ON 11.0	
PESTICIDES/PCBS (µg/g) chlordane	V	0.0170.000780.35	0.11	
PESTICIDES/PCBS (#g/g) PESTICIDES/PCBS (#g/g) Chlordane O.004 C O.003 CM O.004 C O.004 C O.004 C O.004 C O.007 CS A - chlordane	۰ ۷	0.000780.35		
PESTICIDES/PCBS (4g/g) PESTICIDES/PCBS (4g/g) Chlordane Chlordane O.033 C O.034 C O.035 CM ND ND ND ND ND ND ND ND ND N		0.35	0.0047	< 0.00078
PESTICIDES/PCBS (µg/g) chlordane in wifan Sulfate a -chlordane			0.099	0.033
PESTICIDES/PCBS (µg/g) chlordane in wifan Sulfate a -chlordane				
chlordane rin wifan Sulfate a -chlordane				\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \
chlordane rin sulfan Sulfate a —chlordane				¥z.
chlordane rin sulfan Sulfate a — chlordane	0.04 C 0.041 CD	₹N		¥Z
chlordane rin sulfan Sulfate na – chlordane		V N		NA NA
ate ine		3ND R		2ND R
ulfate		YZ II	¥z	NA NA
rdane				Ϋ́
rdane	-	3ND R		2ND R
		30ND R		20ND R
Charles 1200				
OTHER (48/k)			1 000001	00103
rbon	-	200000	148000	36400
Total Petroleum Hydrocarbons	2700 1760 D	1380	167	5/5

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STUDY AREA 57 MARSH AND ASSOCIATED LOWER COLD SPRING BROOK ANALYTICAL SEDIMENT SAMPLE RESULTS

		COLD SPR	どのうとこ	COLD SPRING BROOK SAMPLE LUCATIONS	5	وع و
	UPS	UPSTREAM		DOWNSTREAM	REAM	
ANALYTE	- SD SD SD SD SD SD SD SD	CSD-94-13X 09/22/94	SS	SSD-93-92G 09/16/93)	CSD-94-19X 09/22/94
	5	0 FT		E O		0 FT
\\\ / \\ / O 1\\ LLIFE 1\\						
I'AL MEI ALS (PUS)		10000		20100	L	6130
Assanta		65		51.1		S
Define		90.1		118		63.5
Design	_	50	v	0.427	v	0.5
Deciyinum Codminm	,	2		2		Z
		8380		5440		0869
Chromium		30,9		39.8	٧	4.05
Cohelt		19	٧	2.5		9.31
		28.5		63.7		21.1
Tron		22300		30700		12700
Per		240		340		6 7
Magnesium	-	3220		4340		1740
Manganete		1580		317		1490
Nickel	·	35.9		31.1		20.1
Potassium		809		1540	٧	100
Selenium		3.01	٧	0.449		2.34
Sodium	٧	100		38.7		1820
Vanadium		31.8		45.6		15.8
Zinc		305		290 JR		147
VIII V SCAN V CRO III ANDRE A COMPANY						
FALSEMITOLATILE UNDANICS (PER)		a CINS		CX		SAD R
yn-caroazoic Acamantifulana	٧	0.2	v	0.033	v	0.2
Anthracena	<u> </u>	0.7	v	0.71	v	0.2
Renzo [a] Anthracene	v	9.0		1.2	v	9.0
Penzo [a] Purene	٧	•	v	12	٧	
Benzo (h) Fluoranthene	٧	-	v	0.31	٧	-
Benzo Je.h.il Pervlene	٧	-	v	0.18	v	-
Benzo Ik Fluoranthene		7	v	0.13	٧	0.3
Bis (2 - ethylhexyl) Phthalate	٧	က	v	0.48	v	3
Chrysene	٧	9.0	v	0.032	v	9.0
Thorna		·e		_		0

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STUDY AREA 57 MARSH AND ASSOCIATED LOWER COLD SPRING BROOK ANALYTICAL SEDIMENT SAMPLE RESULTS

LOWER COLD SPRING BROOK SITE INVESTIGATION FORT DEVENS, MA.

		COLD SPR	ING BI	COLD SPRING BROOK SAMPLE LOCATIONS	LOCAT	SNOI
	D	UPSTREAM		DOWNSTREAM	TREAM	
ANALYTE	Ø	CSD-94-13X 09/22/94 0 RT	v	SSD-93-92G 09/16/93 0 FT)	CSD-94-19X 09/22/94 0 FT
Fluorene	٧	0.2	٧	0.065	v	0.2
Indeno [12,3-c,d] Pyrene	٧	***	٧	2.4	٧	-
Phenanthrene		7		1.1		-
Pyrene		œ		2.1		2
(9)*") SUNBURY HILL TO TVA						
1.1.1trichloroethane	v	0.0044	v	0.2	v	0.0044
Acetone		0.22	٧	3.3		99.0
Toluene	_	0.0043	٧	0.1		0.0033
Trichlorofluoromethane		0.096	٧	0.23	_	0.1
PAL PESTICIDES/PCBS (µg/g)		V 0 5552 C M	ļ	100	-	NA.
DDT		O'CCCO'O	, —	7.7		Y :
DDD		0.49 C	v	0.064		¥
DDE		0.14 C		90700		¥
alpha chlordane		£		£		A X
Dieldrin	v	0.00629 M		0.0192		Y Y
Endosulfan Sulfate	٧	0.00763	٧	1.2		¥X
esmms -chlordane		S		Q.		Y.
Aroclor 1260		0.0392 CS		æ		2ND R
V-1/ MILLEUNO						
UIREK (JEKE)		000764		2000	L	161000
Total Organic Carbon		124000		1/000		101000
Total Petroleum Hydrocarbons		460		1800		242

NOTES

D = duplicate
R = Non-target compound analyzed for but not detected.

S = Non-target compound analyzed for and detected.

C = Analysis was confirmed M = Duplicate high spike analysis, not within control limits.

NA = Not analyzed ND = Not detectable

 $\mu g/g = \text{micrograms per gram}$

STORM DRAIN SYSTEM NO. 6 AND ASSOCIATED LOWER COLD SPRING BROOK ANALYTICAL SEDIMENT SAMPLE RESULTS

LOWER COLD SPRING BROOK SITE INVESTIGATION	FORT DEVENS, MA.	

	SSD-93-06B	SSD-93-06B	\$7S-92-01X	\$78-92-02X	\$78-92-03X
BLANK	08/18/93	66/18/93	08/19/92	08/19/92	08/19/92
at lawy	0 FT	0 FT (dup)	0 FT	0 FT	0 FT
(-)/ 5 1 × 1.0 / 1.0					
FAL MEIALS (MUR)	5750	9680 D	NA	NA	AN
Aluminum	10.3	20.9 D	AN	NA AN	AN
Arsenic	24	Q 69	NA	NA AN	AN
Barum	5		NA	NA	Y.
Berymum	- 12 12		NA	Ϋ́N	AN
Cadmium	-		NA	Ϋ́	AN
	27.1	64.6 D	AN	NA	NA
Calculation	4.23	7.39 D	Y.	NA N	NA
Conner	40.7	105 D	NA NA	AN	NA NA
Copper	14900	21800 D	AN	. NA	NA
ונסמ ביין	140	420 D	NA	Y.	Y.
Leau	2500	3770 D	YY Y	NA	NA
Magnesium	184	320 D	N	NA NA	NA
Mangairese	> 0.05	0.115 D	NA	YN.	NA
Mercury		22.8 D	NA NA	AN	NA
Description	885	1670 D	NA	NA.	NA AA
Calantium	Ð	QN	NA	NA V	YN Y
Codium	76.2	138 D	NA	Ϋ́	YZ YZ
Tin	< 7.43	13.5 D	AN	NA	YY
//www.	16.8	36.8 D	NA	Ϋ́Z	AN AN
Zinc	83.1	189 D	NA	NA	NA
(1)					
PAL SEMIVOLATILE ONOMING (PEE)	SS.	SE SE	QN.	SZ.	QN
2 - methylpanhthalone	0.19	0.15 D	~	2	2
Acensulthene	0.22		< 0.7	~	·
Acenaphthylene	32		6.0	-	-
Anthracene			< 0.7	_	~ V
Renzo (a) Anthracene	3.5		3	7	
Benzo (a) Perene	4.1	3.1 D	۰ ج	v 10	· 10
Benzo [h] Flioranthene	4.9		√		∞
Benzo [o] h il Perviene	4.9	3.1 D	۰ د	10	-
Renzo (ki Fluoranthene	3.6	3 D		₹	4
Ris (2 - ethylhexy) Phthalate	1.4		v 01	° 7	° 50
Chrysene	4.3	3.3 D	7	S	vo (
Di-n-huty Phthalate	9.3	6.2GT D	·	7	7

STORM DRAIN SYSTEM NO. 6 AND ASSOCIATED LOWER COLD SPRING BROOK ANALYTICAL SEDIMENT SAMPLE RESULTS

	SSD-93-06B 08/18/93 n 87	SSD-93-06B 08/18/93 0 FT (Alm)	575-92-01X 08/19/92 0 FT	575-92-02X 08/19/92 0 FT	57S-92-03X 08/19/92 0 FT
	083	0.31 D	*	8	v
Dibenz la,nj Amnracene	5.2		-	•	_
rinoraninene	0.61	< 0.065 D	< 0.7	-	v
Tribotelie	2	£	Q.	£	Q
Macino (1,4,3,4,4,4) i prene	4.6	32 D	< 0.7	*	
rnenantirene	5.9	4.6 D	< 0.7	10	10
PAT VOLATITE ORGANICS (46/8)					
1 1 1 dishbardhan	S S	2	NA	٧X	ž
1,1,1 - Ircinol centalic	2	2	NA	NA AN	AN NA
Actione	2	8	NA	AX —	Ž
1 olucine Trebloroffioromethane	£	QN.	AN	NA	X
OTHER (#g/g)	75000	AN	24500	24700	18400
Total Organic Carbon	3500	2600 D	1860	1410	2210
Total Petroleum Hydrocarbons	3500	Z900 D	1800		2

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STORM DRAIN SYSTEM NO. 6 AND ASSOCIATED LOWER COLD SPRING BROOK ANALYTICAL SEDIMENT SAMPLE RESULTS

			}			COLD SI MING BROOM SAME LE LOCATIONS		
	UPSTREAM					DOWNSTRBAM		
	CSD-9	CSD-94-10X	aso	CSD-94-11X	8	CSD-94-12X	33	G3D-92-01X
ANALYTE	09/20/94	16/0	•	96/1/94		09/21/94		06/23/92
	OFF	E		0 FT		0 FT		0 FT
PAL METALS (42/g)								
Aluminum		2030		12300		11800		17400
Arsenic		26.8		47.4		29		120
Barium		41.9		83.7		103		121
Beryllium	v	5.0	v	0.5	٧	5 '0.		4.37
Cadmium		R		£		£		Q
Calctum		4500		8540	-	9740		13500
Chromium		16.7		44.5		39.7		50.7
Cobalt		5.78		16		17.2		29.8
Copper	1 	2		35.7		37.9		42.2
Iron		8150		19200		23200		33100
Lead		55.5		273		258		340
Magnesium		1460		3650		3250		4960
Manganese	-	1340		934		1840		1020
Mercur		£		£		S		S
Nickel		11.6		35.2		33.6		55.1
Potassium	v	9		840		999		1580
Selenium		1.09		2.98		2.57	v	0.25
Sodium		606		1830		2000		727
Tin		£		S		æ		£
Vanadium		=		38.4		34.3		\$0.7
Zinc		63.2		336	_	341		479
PAL SEMIVOLATILE ORGANICS (446/6)								
1		£		æ		QN		QN.
2-methylnaphthalene	-	A CINI.		SND R		SND R		.165ND R
Acenaphthene		욷		S		Ž		2
Acenaphthylene	<u>v</u>	0.033	v	0.2	<u> </u>	0.7	v	0.165
Anthracene	v	0.033	v	0.2	v	0.2	٧	0.165
Benzo [a] Anthracene		0.42	v	9.0	v	0.8	v	0.8
Benzo [a] Pyrene	v	0.25	٧	-	v	-	v	1.25
Benzo [b] Fluoranthene	v	0.21	v	-	v		v	1.05
Benzo [g,h,i] Perylene	v	0.25	v	-	v	1	v	1.25
Benzo [k] Fluoranthene		0.47		'n		7	٧	0.33
Bis (2-ethylhexyl) Phthalate	٧	0.62	v	E	v	3	٧	3.1
Chrysene		0.84		ø	V	9.0	٧	9.0
D. Lucal Philippia		Ş		Ę		Ę		Ę

STORM DRAIN SYSTEM NO. 6 AND ASSOCIATED LOWER COLD SPRING BROOK ANALYTICAL SEDIMENT SAMPLE RESULTS

LOWER COLD SPRING BROOK SITE INVESTIGATION FORT DEVENS, MA.

CSD=-94-11X CSD=-94-11X CSD=94-12X CSD=95-104 OFT)	COLD SPRING BROOK SAMPLE LOCATIONS	K SAMPLE LOCAT	IONS	
CSD-94-10X CSD-94-11X CSD-94-11X CSD-91-97-11X OF/1294		l		DOWNSTREAM		
Columbia Columbia		CSD-94-10X	X11-16-080	CSD-94-12X	C3	D-92-01X
ND ND ND ND ND ND ND ND	ANALYTE	09/20/94 n FT	09/21/94 0 FT	14/17/40 0 FT		06/23/92 0 FT
C.d Pyrene	Dilene fo bl Authoropa	GN		æ		Ð
Columbiate Col	Dipenz (4,11) Animacene	080	6	en		3.69
c,d] Pyrene < 0.29 constraints 1 constraints 1 constraints 1 constraints 1 constraints NA constraints	Fluorantene				v	0.165
TLE ORGANICS (με/ε)	Fluorence 11. Jan 11. Document				v	1.45
TLE ORGANICS (μg/g)	Indeno (1,4,3 -c,u) ryteire		~	7		2.63
TLE ORGANICS (µg/g)	Pyrene	1.6	6	9	_	7.54
Sethanc NA NA NA NA 0.0 Omethanc NA NA NA 0.0 <td>PAT VOI ATHER ORGANICS (48(8)</td> <td></td> <td></td> <td></td> <td></td> <td></td>	PAT VOI ATHER ORGANICS (48(8)					
NA NA NA NA O 0.00		ΨX	YN	Y Y	٧	0.0044
MA NA NA 0.00 YDES/PCBS (με/ε) NA 0.0923 CM NA 0.0923 CM NA 0.0923 CM NA 0.00	1,1,1 - urcilotoculaire	₩Z.	AN.	Y.		0.657
IDES/PCBS (μg/g) NA NA NA 0.0923 CM NA 0.0923 CM NA NA 0.01 C NA	Actione	¥z.	¥X	NA	٧	0.00078
NA 0.0923 CM NA 0.41 C NA NA 0.41 C NA NA 0.2 C NA NA 0.2 C NA NA 0.2 C NA NA 0.00629 CM NA NA 0.0063 CS 2ND R NA 0.0663 CS 2ND R 272 2334 574 272 534 574 272 272 534 574 272 272 534 574 272 272 272 534 574 272 272 272 272 272 272 272 272 272 272 272 273 274 274 274 274 275	John Tripe	₹ X	NA NA	NA	v	0.0059
NA 0.0923 CM NA 0.41 C NA NA NA NA NA NA NA	11VIII CONTRACTOR CONT					
NA 0.0923 CM NA NA NA NA NA NA NA N	PAI. PESTICIDES/PCBS (ug/g)					
NA 0.41 C NA NA 0.2 C NA NA NA NA NA NA NA		NA	0.0923 CM	YZ YZ		Y Z
NA 0.2 C NA NA NA NA NA NA NA		¥X	0.41 C	Y.		¥Z
MA 0.00629 CM NA dane .33ND R < 0.0063 CS	300	٧z	0.2 C	NA		¥z
Mate NA < 0.0063 CS 2ND R dane .33ND R 0.0663 CS 2ND R [k] Carbon 149000 223000 carbon 272 534 574	Di-H-i-	AN A		NA A		NA NA
dane .33ND R 0.0663 CS 2ND R /g) S5700 149000 223000 Carbon 272 534 574 im Hydrocarbons 574 574		₩.		AN		¥Z
	Endosunan Sunane	33ND R		2ND R		2ND R
Carbon 223000 223000 223000 III Hydrocarbons 272 534 574	(*/**) aditio					
im Hydrocarbons 272 534 574	Total Organic Carbon	85700	149000	223000		4250
NOTES:	Total Petroleum Hydrocarbons	272	534	574		472
D - Analizate	NOTES:					
	D - diminate					

M = Duplicate high spike analysis, not within control limits. C = Analysis was confirmed.

R = Non-target compound analyzed for but not detected.
S = Non-target compound analyzed for and detected.

NA = Not analyzed

ND = Not detectable

 $\mu g/g = \text{micrograms per gram}$

STORM DRAIN SYSTEM NO. 7 AND ASSOCIATED LOWER COLD SPRING BROOK ANALYTICAL SEDIMENT SAMPLE RESULTS

AMALYTIC AMALYTIC AMALYTIC AMALYTIC AMALYTIC AMALYTIC AMALYTIC AMALYTIC AMALATTIC				III	DITCH SAMPLE LOCATIONS	SNOL			
CCD - 24 - O. V. CCD - 24 -									
Column C		CSD-94-04X	A70-53-07A		CSD-94-05	SSD-93-07B		ບ 	SD-94-07
State Stat	ANALYTE	09/19/94 n m	08/18/93	09/19/94	0 FT (duo)	0 FT	0 FT		0 FT
State Stat									
128 991 379 344 945 945 377 4 544 945 945 377 4 544 945 945 946	PAL METALS (µg/8)	4280	0929	13900	2670 D	20900	6210	-	9760
Name	Aluminum	12.8	100	37.9		41.6	9.75		16.2
National Part National Par	Arsenic	36.2	59.6	207	5.18	545	28.5		82.8
1	Bartum	•		3.37	0.5	8.35		v	0.5
1940 6450 6470 1940 6450 6470 1940	Beryllium C-1-i			6.43	0.7	10.6		٧	0.7
Color Colo	Caemium		6450	6470	1020 D	6910	1430		2430
11 12 13 14 15 15 15 15 15 15 15			18.6		4.05	9.64	30.2		40.5
13.5 13.5	Caromium		4.39		20.6 D	298	4.32		15
1500 1500	Coorii	7.31	20.6	87		36.2	13.5		22
117 226 1390 431 D 2200 234 135 130 431 D 2200 234 131 1320 234 131 1320 234 131 1320 234 131 1320 234 131 1320 234 131 1320 234 131 1320 234 131 132 234 131 132 234 131 132 234 131 132 234 131 132 234 131 132 234 131 132 234 131 132 234 131 132 234 131 132 234 131 132 234 131 132 234 131 132 234 131 13	Copper	9230	15900	28300	4190 D	67800	10300		19600
Seeding	Tour I	-	97	136	83 D	91	109		212
Second S	Lead	817	2960	1390		923	3280		4600
194 13.7 145 23.2 D 140 16.5 19.5 1	Magnesium	1610	189	8260		25000	264		1340
Name	Manganese M:-L-1	19.4	13.7	145	23.2 D	140	16.5		34.4
Column C			544		100		916		1290
Marcine Carlo Ca	Calanium	_	< 0.449		0.25			v	0.25
Marcelean	Sodium	775	67.2	1980	100	455	642		932
### VOLATILE ORGANICS (LLPR) WID NID NID NID NID NID NID NID NID NID N	Vensdim		10.8	25.7	3.39	24.6	16.1		27.4
EMITYOLATTILE ORGANICS (µg/g) ND	Zinc	69	46.9	604		415	6.69		158
Particle Particle									
chazole ND ND <t< td=""><td>PAL SEMIVOLATILE ORGANICS (µg/g)</td><td></td><td>4.4</td><td></td><td>NIN I</td><td>CN</td><td>UN</td><td>F</td><td>UN</td></t<>	PAL SEMIVOLATILE ORGANICS (µg/g)		4.4		NIN I	CN	UN	F	UN
Name	9-h carbazole		2 %						2 6
A color	Acenaphthylene	>	85.5	>				, 	Ž
Anthracene	Anthracene		23		25			_	80
State Stat	Benzo [4] Anthracene		6.04		2 2	>		<u>, </u>	Ş
Fluoranthene Composition	Benzo [a] Pyrene		2 2		28.5				
Shij Ferylene	Benzo (k) Fluoranthene		8.5 S	•					N QN
	Benzo [g,h,i] Perylene	2 9	2 5	2 5	S	Ş	S		Q
thymestyl runnalate	Benzo [k] Fluoranthene	2 5	2 8	2 2	2	2	2		S
Signature Comparison Comp	Bis(2-emyinesyi) rnunalaue		0.84		0.94 D	0			60
1.2 1.7 D	Chryselle Dit : _ hum Dribelete		5.5		Ü			٧	0.3
ND ND ND ND ND ND ND ND	Elicenthene				1,7 D	-	7		9
[12,3-c,d] Pyrene ND	Fliorence	QN.	QX	QZ	2	QX	Q		QN
threne 0.16 1 0.74 0.92 D < 0.032 0.28 1.5 1.4 1.4 D < 0.083	Indepo (12.3—c.d) Pyrene	QX	QN	QN .	QN	QN	QN		QN
0.28 1.5 1.4 1.4 D < 0.083	Phenanthrene	0.16		0.74	0.92 D		- 2		m (
	Pyrene	0.28	1.5	1.4	1.4 D		2		5

06-Dec-95

STORM DRAIN SYSTEM NO. 7 AND ASSOCIATED LOWER COLD SPRING BROOK ANALYTICAL SEDIMENT SAMPLE RESULTS

LOWER COLD SPRING BROOK SITE INVESTIGATION FORT DEVENS, MA.

ANALYTE	CSD - 94 - 04X 09/19/94 0 FT	SSD-93-07A 08/18/93 0 FT	DITCH S CSD-94-05 09/19/94 0 FT	DITCH SAMPLE LOCATIONS 05 - CSD-94-05 SS 09/19/94 0 0.FT (dup)	NS SSD-93-07B 08/18/93 0 FT	CSD - 94 - 06 09/19/94 0 FT	CSD-94-07 09/19/94 0 FT
PAL VOLATILE ORGANICS (µg/g) 1,1,1-trichloroethane Acetone Toluene Trichlorofluoromethane	A X X X	8888	AN NA NA NA	4	4 4 4 4 X	A A A A	A A A A
OTHER Total Organic Carbon Total Petroleum Hydrocarbons	41700	9600	85600 470	199000 D 481 D	1500000	27800 2320	63200 1590

Page 2 of 4

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STORM DRAIN SYSTEM NO. 7 AND ASSOCIATED LOWER COLD SPRING BROOK ANALYTICAL SEDIMENT SAMPLE RESULTS

			UPSTREAM				ĭ	DOWNSTREAM		
	\$7D-	57D-92-01X	S7D.	\$7D-92-01X	၁	CSD-94-08X		CSD-94-09X	SS	SSD-93-92E 08/08/03
ANALYTE	0 0	0 FT	\$ ~ 	0 FT		o FT		O FT		0 FT
1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-										
FALMEN (BES)		11700		NA	L	0229		9330		18000
A		55.3 J		NA		20.7		30		54.7
Assure		93.9		٧×		61.2		92.3		125
		0.5		X	٧	0.5	٧	0.5	٧	0.427
Beryllium	<u>, </u>	Ş		¥Z.		QX		QN		S
Chamium		910		Y X		2410		2760		12500
Carcium		113		¥ Z		26.1		31		44.3
Chromium		21.3		¥ Z		10.7		16.2		22.4
Cobait		27.0		Į V		16.4		28.1		30.1
Copper		00950		Y X		14600		20400		35000
Iron		9		47		141		180		190
Lead		3160		Y N		2000		2790		4520
Magnesium		2100		42		1030		2040		2440
Manganese	_	3.6		4 2		346		702		31.3
Nickel		777				21.0				1160
Potassium	,	86/		4 2 2		970		121		0 440
Selenium	<u> </u>	67.0		42	<u> </u>	0.45		1.70	<u>, </u>	340
Sodium) i		۲ ×		5 t		00 ye		j E
Vanadium		32.4				143		73.4		350
Zinc		657		VV.		C+I		103		
(*/**) SUIVED BORNINGS IVE	-									
O_beathardle		SND R		2ND R		SND R		SND.		
Arenaphthene	V	0.2	v	0.2	v	0.2	٧	0.2	v	0.033
Anthracene	٧	0.2	v	0.2	٧	0.2	v	0.7	٧	0.71
Dames (a) Anthracene	<u>v</u>	8.0	v	9.0	٧	0.8	v	9.0		1.6
Denzo (a) Direne	v	-	v	-	v		٧	7	v	1.2
Jenes (a) I yiene		-		-	٧	-	v	-	٧	0.31
Denzo (k.) ribolantene Denze (e.k.:) Dendene	· v	-	v	-	<u>v</u>	-	٧	_	v	0.18
Denzo [g.n.i] retylene	<u>'\</u>	· 6	· V	6		-	٧	0.3	v	0.13
Benzo [k] Fluoranthene	<u>/ \</u>	3 "	′ \			. «	· V	**	v	0.48
Bis(2-ethylnedyl) Fnunalate		, 4	<u></u>	9	, 	, ,		4	· v	0.032
Chrysene	<u> </u>	9 5	· /	2		, §		Ž	,	
Di-n-butyl Phthalate	,	S S		, ,		<u> </u>		4		1 8
Fluoranthene	<u> </u>			° 6	\		_	. 20	V	0.065
Fluorene	v ·	7.	/ ·	7.0	<u> </u>	1	<u> </u>	; -	′ v	7 4
Indeno [1,2,3-c,d] Pyrene	v '	- 6	<u> </u>	- •	<u></u>	- 6	<u>,</u>	- (<u>,</u>	† a
Ohensuthrene	٧	7.0		-		'n	_	1		7.0

STORM DRAIN SYSTEM NO. 7 AND ASSOCIATED LOWER COLD SPRING BROOK ANALYTICAL SEDIMENT SAMPLE RESULTS

LOWER COLD SPRING BROOK SITE INVESTIGATION FORT DEVENS, MA.

	ISAN	UPSTREAM COLD SPRING	COLD SPRING BROOK SAMPLE LOCALIONS AM DOWNSTRE	DOWNSTREAM	
ANALYTE	57D-92-01X 01/11/93 0 FT	57D-92-01X 08/19/92 0 FT	CSD-94-08X 09/19/94 0 FT	CSD-94-09X 09/20/94 0 PT	SSD-93-92E 09/08/93 0 FT
PAL VOLATILE ORGANICS (44/4)					
1.1. richloroethane	> 0.0044	AN	NA	NA	v
Acetone	0.44	NA	NA	AN AN	< 3.3
Tolnene	0.00078	NA	AN	NA	·
Trichlorofluoromethane		NA	NA	NA	< 023
PAL PESTICIDES/PCBS (42/g)				-	
DDT	Ϋ́Χ	YN.	0.0202 C	NA AN	< 0.1
ממט	Ϋ́ X	NA	0.0518 C	NA AN	0.0
adu adu	٧×	NA AN	< 0.00765	AN A). V
Dieldrin	ΨX	NA AN	< 0.00629	Ϋ́	< 0.079
Endosulfan Sulfate	¥X —	YZ YZ	< 0.00763	AN A	0.01
gamma -chlordane	2ND R	2ND R	2ND R	2ND	
CHER					
Total Organic Carbon	Ϋ́	34800	75700	132000	170000
Total Petroleum Hydrocarbons	466	497	734	635	160

NOTES:

D = duplicate

C = Analysis was confirmed
R = Non-target compound analyzed for but not detected
NA = Not analyzed
ND = Not detectable

 $\mu g/g = micrograms per gram$

STORM DRAIN SYSTEM NO. 8 AND ASSOCIATED LOWER COLD SPRING BROOK ANALYTICAL SEDIMENT SAMPLE RESULTS

LOWER COLD SPRING BROOK SITE INVESTIGATION FORT DEVENS, MA.

	DITCH SAMPLE LOCATION
	SSD-93-08A
ANALYTE	08/18/93
	0 FT
PAL METALS (µg/g)	
Aluminum	14300
Arsenic	13.2
Barium	49.2
Beryllium	0.945
Calcium	1510
Chromium	38
Cobalt	13.8
Copper	26
iron	19200
Lead	110
Magnesium	3040
Manganese	595
Mercury	ND
Nickel	17.9
Potassium	1430
Selenium	ND
Sodium	121
Vanadium	26.4
Zinc	190
PAL SEMIVOLATILE ORGANICS (μg/g) 9h – carbazole	ND
	ND
Acenaphthylene Anthracene	ND
Benzo [a] Anthracene	ND
20 [a] Pyrene	ND
benzo [b] Fluoranthene	ND
Benzo [g,h,i] Perylene	ND
Benzo [k] Fluoranthene	ND
Bis (2-ethylhexyl) Phthalate	ND
Chrysene	0.4
Di-n-butyl Phthalate	2.1
Fluoranthene	0.53
Fluorene	ND
Indeno [1,2,3-c,d] Pyrene	ND
Naphthalene	ND
Phenanthrene	j 0.48
Ругепе	0.45
PAL VOLATILE ORGANICS (µg/g)	
1,1,1 - trichloroethane	ND
Acetone	ND
Toluene	ND
Trichlorofluoromethane	ND ND
PAL PESTICIDES/PCBS (μg/g)	
DDT	NA
DDD	NA
DDE	NA
Dieldrin	NA
Endosulfan Sulfate	NA
gamma-chlordane	NA NA
OTHER (µg/g)	
Total Organic Carbon	66000
Total Petroleum Hydrocarbons	

COLD SPRING BROOK		
UPSTREAM		WNSTREAM
CSD-94-03X	>	SD-93-92D
09/20/94		09/07/93
0 FT	4	OFT
3590		15400
14		25.8
15.7 ND	1 _	72.8 0.427
1010	<	3140
8.53		39.4
2.98		11.7
6,39	1	4.76
7020		37200
30.8		34
1330		11000
516		1500
< 0.05 J		ND
8.98		37.4
194		3830
< 0.25	<	0.449
502 6.45		91 26.9
48.7		85.2
	1	4,2
1ND R		ND
< 0.033	<	0.033
< 0.033	<	0.033
< 0.17	<	0.041
< 0.25	<	1.2
< 0.21	<	0.31
< 0.25	<	0.18
0.15	<	0.13
ND	<	0.48
0.25	<	0.032
ND 000		ND 0000
0.29 < 0.033	<	0.032 0.065
< 0.033 < 0.29	< <	2.4
< 0.037	`	ND
0.15	<	0.032
0.4	<	0.083
NA NA	T	0.28
NA	<	3.3
NA	<	0.1
NA NA	<	0.23
0.012 CM	<	0.1
0.0324 C	<	0.064
0.0234 C	<	0.068
ND	<	0.079
ND	<	1.2
33ND_R		
22000		50000
103		23

VOTES:

C = Analysis was confirmed

= Duplicate high spike analysis, not within control limits.
Non-target compound analyzed for but not detected.

A = Not analyzed

ND = Not detectable

1g/g = micrograms per gram

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STORM DRAIN SYSTEM NO. 9 AND ASSOCIATED LOWER COLD SPRING BROOK ANALYTICAL SEDIMENT SAMPLE RESULTS

			ľ										
	NSD-95-091.	: \$		SSD-95-69K		SSD-93-09A \$19783	326-26-QSS		150-56-USS	-	88D-9	160-56-U88	6000 6000
ANALYTE						677							
PAL METALS (μg/g)								ŀ		ļ	ľ		ŀ
Aluminum	11600	9 B		3320	Ø	5850	3080		4780	m	4	8 9	
Arsenic	24.			4.25		17.5	13.1		13.3		2		
Barium	64.	8		16.3	m	19.5	7.85		18.9	m	2	∞; ∞	<u>v</u>
Calcium	475			73	m	1080	482	-	1870	m	ĕ		
Chromium	46.0	١.		9.38		17.4	6.24		10.8		7	e ç	<u> </u>
Cobat	12.		٧	2.5		3.14	Q	<u> </u>	2.5		, 2	.	٧
Conner	62.9	_		6.24		11.1	QN		8.38		œi		
los	2630			0069	æ	14200	6440		8030	<u>m</u>	O V		_
	82			13.2	æ	52	6.31		32.6	m	٩'n		
Memorium	473	0 B		1410	æ	3030	1370		1470	B	27	30 BB	
Manoanese	864			62.6	Ø	108	214		195	m	8		
Merciny	.16	_	٧	.0.		Q	Q	V	.05		o.	•	٧
Nickel Nickel	29.	_		5.02		13.6	3.94		7.09		9.52		
Potaecium	256	0 13		849	B	672	2		480	Д	S	7 B	
Selenium	YZ.			NA		Ę	QX	_	AN		Z	⋖	٧
Sodium	241			9.19		86	R		112	_	8 8		
Vanadium	49.	B B		7.85	Ø	12.6	4.09		7.75	m	o.		<u>ү</u>
Zinc	272		_	25.9	m	43.6	18.1	4	40.8	副	2		ᆜ
PAL SEMIVOLATILE ORGANICS (42/2)										ı			ŀ
	» >		L	ε;		NA	YY		wi į		ci ;		
Acenaphthene	80. V			_		Y.	Y !	<u> </u>	8 0.	_	e ; v	.	
9h-carbazole		_		Y Y		Q	Q ;		Y !		Z`	€.	
Acenaphthylene	, 0.			۲.		2	0.15	<u> </u>				_	
Anthracene				~		Q :	2 :	<u> </u>	- •	_	 v		
Bis(2-ethylhexyl) Phthalate	70		<u> </u>	-		AA	Y S	<u> </u>	(_			_
Benzo [a] Anthracene				7		2	0.64		۲.				
Benzo [a] Pyrene				٠		£	2	<u> </u>	7	<u> </u>	v .		
Benzo [b] Fluoranthene	.			0		Q	2	<u> </u>	Ģ		2	_	
Renzo (g.h.i) Pervlene				7		Q.	Q	v	4.	<u> </u>	٠. ٧		
Benzo Iki Fluoranthene	۸ د:			٣		Q.	0.51	<u> </u>	ų.		•		
Chrysene				9		3	9.0		o;		•		
Dibenzofuran	∞ , ∨			-		AN	Y Y	<u> </u>	œ	<u> </u>	~. V		
Di-n-butyl Phthalate	> 3		٧	e		NA	NA A	V	e	_	v		 -
Fluoranthere	o.			2		Q	0.95		∞i		•		
			•										

\$000000	TIPSTRRAM	2	8008 828	8	8		G BRC	Š	3	COLD SPRING BROOK SAMPLE LOCATIONS DOWNSTREAM	SE	Ē	P LOCATIONS DOWNSTREAM				
0. 2000000000000	SSD-93-93C		SSD-96-050	8		88	160-56-USB	F .	Ö	CSD-94-01X 99/20/94 0 FT	×_	0	CSD-94-02X B921/94 • FT		5 2	N60-56-058	116
8																	
_	3080	H	4780	2	一		4400	B		1720	Γ	L	13100	Γ		2440	В
_	13.1	_	13	6.			12.1			11.9			62			9.4	
_	7.85		18	o:	B		10.8	Ø	٧	5.18			. 117			16.8	Ω
	482		1870	2	B		199	B		408			6780			788	æ
	6.24		2	00	_		14.8		٧	4.05			4		_	5.51	
	QX			~		v	2.5		٧	1.42			9.6			23.2	
	QX		8.38	80			œ.			3.04			48.8			2.84	
	6440		8030	9	8		9840	8		3450			28700		٧	5080	æ
	6.31		32	9.	В		\$4	B		5.48			241			9.01	B
	1370	_	1470	2	В		2730	В		637			4130			932	M
_	214		195	ž	B		64.1	8		61.5			861			517	m
	QX			8		v	.05	,	٧	0.05	~		0.247	ר		.0S	
	3.94		7.09	6	_		9.52			4.12			33.5		v	26.3	
	S		480	9	В		527	B		195			1380		v	197	B
	S		Ž	⋖			Y Y		٧	0.25			1.78			Y Y	
	Æ		=	7		v	38.7			409			1900			38.7	
	4.09		7.7	2	В		9.76	В	٧	3.39			34.3			3.31	B
	18.1	_	40.8	∞.	B		57.6	BI		15.2			332			55	Ē
_																	
_	NA	\vdash	ال		一		2.	Γ	L	Ϋ́		L	NA A	Г		.032	
	NA		80.	∞	<u> </u>	v	80:			N A			NA		v	.04	
	QX		Ž	4			Ą			0.28	83		ONI	ĸ		Y Y	
_	0.15	<u> </u>		7			o;			0.12		v	0.3		٧	.033	
	Q	<u> </u>	_			v	-			0.19		v	0.3		v	۲.	
	Ϋ́	_				v	_			Y.			Ϋ́		v	.	
	0.64		٠.	_	_		1			0.7		v	7		٧	.041	
	Q			٠.		v	7			0.74		٧	7		v	1.2	
	QX			~			10			89.0		٧	7		٧	.31	
	Ş		₹,	_		v	4.			0.38		v	7		٧	.18	
	0.51		e.i	~			4			0.61		٧	0.7		v	.13	
	99.0		ο;	_			90			1.3		v	~			.032	
	NA		ω.	•		v	∞i			NA			N		v	38	
_	NA	<u> </u>			_	v	6			N A			N		v	1.3	
	0.95		œi	•			0			2.1			S		v	.032	
	0.17		-:		_		7			0.16		٧	0.3		v	.065	

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STORM DRAIN SYSTEM NO. 9 AND ASSOCIATED LOWER COLD SPRING BROOK ANALYTICAL SEDIMENT SAMPLE RESULTS

LOWER COLD SPRING BROOK SITE INVESTIGATION FORT DEVENS, MA.

	birc	HS	DITCH SAMPLE LOCATIONS	Y)	BNOU	
ANALYTE	28D-95-09L		88D-95-09K	¥	\$90.93.09A \$19.53 8 FT	SSD-95
Hexadecanoic Acid / Palmitic Acid	6	NB RB	7	Z	NA	AN
Indeno [1,2,3-c,d] Pyrene			N A		Ę	QX
Naphthalene	Y'N		N A		S	QX —
Octadecanoic Acid	2 7	NB NB			NA	AN.
Phenantirene			70		Q.	1.7
Pyrene	1	-	10		ND	1.4
PAL PESTICIDES/PCBS (µg/g)						
Endosulfan Ii	.00296	> 0	.0007		ΝΑ	Y.
Dieldrin		-	.0023\$	ပ သ	ΝΑ	Y.
TOO		2	.0056		NA	AN
QQQ		ပ	.0121	ບ	NA	Y.
DDE	.0113	_	.00428		NA	YY V
gamma-chlordane	NA		¥Z		NA	Y.
OTHER (µg/g)						
Total Organic Carbon	125000	L	1490		\$1000	0096
Total Petroleum Hydrocarbons	965		537		270	NA
NOTE:						

	**			NB			XB.			Γ		_	ပ			Γ	
		H60-56-088			Y Y	NA	18:	.032	.083	.0007	9100.	.003	.00505	.0027	NA	7400	534
		2		>			v	٧	v	L	v	v	v	v	_	L	
		×,											v v				
TIONS	LUWING KEAM	CSD \$4.02K B72.184	• • FT	NA	د د	_	NA	m	9	NA	X	0.15	0.56	0.16	0.0716	120000	2120
ଧ୍ର	ŝ	2		Г						Г					R	┢	
AMPLETA	3	CSD-94-01X 9720:94	OFT	ΥN	7 .0	0.073	A	9.1	2.4	Ϋ́	٧Z	X	¥	¥	33ND	2080	61
				NB			_	_		z	ပ	2	X	ပ			
COLD SPRING BROOK SAMPLE LOCATIONS		160-56-USB			AN	Ϋ́		01	10	.00303	.0135	.0216	.106GT	.0203	NA	24200	315
80	*			NB				_		2	ပ	5	ပ	ם	٦	┢	
	147	780-38-088			Y.	Y'N		—		.00294	.0118	.0319	.0927	.0774	NA	36600	77.8
	OFSIKKAM	SSD-93-92C		NA	Ð	Q.	ΑN	1.7	7.	NA	NA	NA	ΑN	Ϋ́N	NA	0096	NA

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	4
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ᄫ	4
¥	•

R = Non-target compound analyzed for but not detected S = Non-target compound analyzed for and detected

NA = Not enalyzed
ND = Not detectable
X = snalyte concentration is above the upper reporting level

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STORM DRAIN SYSTEM NO. 5 ANALYTICAL SEDIMENT SAMPLE RESULTS

LOWER COLD SPRING BROOK SITE INVESTIGATION FORT DEVENS, MA.

	DIT	CH SAMPLE LOCAT	IONS			
	SSD-93-05A	GRD-94-06X	GRD-94-07X			
ANALYTE	08/17/93	09/19/94	09/19/94			
	OFT	0 FT	0 PT			
PAL METALS (μg/g)						
Aluminum	30400	10700	42200			
Arsenic	43	20	5.35			
Barium	99	57	< 5.18			
Beryllium	1.62	< 0.5	< 0.5			
Cadmium	4,59	0.931	< 0.7			
Calcium	6960	591	1830			
Chromium	163	36.9	< 4.05			
Cobalt	28.8	< 1.42				
Copper	163 36.9 <					
Iron			63 2200			
Copper Iron Lead Magnesium Manganese Mercury Nickel Potassium Selenium Sodium Vanadium Zinc PAL SEMIVOLATILE OR GANICS (µg/g) Acenaphthene Acenaphthylene Anthracene Benzo [a] Anthracene Benzo [a] Pyrene Benzo [b] Fluoranthene Benzo [g,h,i] Perylene Benzo [k] Fluoranthene	160	356	160			
	•		1			
		1	43.2			
	< 0.05	0.0961	< 0.05			
	82	25.3	< 1.71			
	5950	755	< 100 8.64 5310 < 3.39			
	< 0.449	0.67	8.64			
	270	448	1			
	88.6	48.8	1			
	301	63.7	< 8.03			
	(μg/g) 0.21	< 2	< 0.036			
	3.8	3	< 0.033			
	4.5	< 2	< 0.033			
	5.9	< 8	< 0.033			
		_	·			
		1	1			
	Benzo [a] Pyrene Benzo [b] Fluoranthene Benzo [g,h,i] Perylene		5.8 < 10 < 6.9 20 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10			
			1	·-·		
				1		
Fluoranthene	7.3	30	< 0.068			
Fluorene	0.91	< 2	< 0.033			
Phenanthrene	8.4	10	< 0.033			
т пенапинене Рутепе	12	30	0.66			
I Jiviiv			0.00			
OTHER (µg/g) Total Organic Carbon	55000	92600	428000			
Total Petroleum Hydrocarbons	3200	1570	3200			
NOTES:	3200	13/0	3200			

 $\mu g/g = micrograms per gram$

LOWER COLD SPRING BROOK SITE INVESTIGATION FORT DEVENS, MA

		2 2000000000000000000000000000000000000									(880000)		200000				**
	CSW-94-01X	XI.	CSW-S4-DE)	XIO.	ပ	X10-84-01X	8 °	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	<u>.</u>	XXXXXXXX	<u> </u>	2W-94-0X	×	CSW-S4-08X	8	XX 24.00X	
ANALYTE	be my con		(Ottered)	: 9		ACTIVA .	Į,	(filtered)		es marca		(filtered)		No.		(filtered)	
PAL METALS (ug/L)																	
Aluminum	I † I	Ť	< 141		_	297	V	141	F <	141	<u> </u>	141	F	141	v	141	뜨
Antimony	< 3.03		< 3.03	F	v	3.03		3.03	<u>۷</u>	3.03	v	3.03	<u>v</u>	3.03		3.48	Į.
Arsenic	3.52		3.09			5.22		3.73	Į2.	4.9		3.41	Ŀ	5.44		3.94	124
Parium	8 .06		8.24	<u>.</u>		12.8		7.38	íz,	5.37	٧	₩.	Ŀ,	7.86		6.9	Ŀ
Beryllium				<u> </u>	<u>v</u>	8	v	~	٧ ٧	٠,	v	~	<u>r</u>	•	<u> </u>	۰	Į,
Cadmium	< 4.01		< 4.01	- E	v	4.01	v	4.01	<u>۷</u>	4.01	v	4.01	<u>~</u>	4.01	v	4.01	124
Calcium	23800		23900	5		24200		24300	i.	23200		23100	į,			22200	ы
Cironium			< 6.02	2 F	v	6.02	v	6.02	<u>.</u>	6.02	v	6.02	<u>.</u>	6.02	v	6.02	í.,
Cobat	> 25				v	25	v	22	<u>۷</u>	22	v	23	<u>v</u>		v	25	Ľ,
Conner	_		_	7 F	v	8.09	v	8.09	F	8.09	v	8.09	<u>v</u>		v	8.09	12,
·			85.4	1		169		-	<u> </u>	474		87.8	į.			207	14
[ead	< 1.26	<u> </u>	< 1.2	S		2.39	v	1.26	<u>v</u>	1.26	v	1.26	į.	1.41	v	1.26	124
Mamerium	3380		3430	0 F		3410		3400	<u> </u>	3270		3280	<u>.</u>	3260		3190	ĮŁ,
Manganese	49.5		48.1	-		59.2		44.7	[24	45.1		10.1	14	4.75		56.4	į.
Mercury				<u>.</u>	v	.243	v	.243	۲. >	.243	v	.243	<u>~</u>	.243	v	.243	ir,
Nickel	< 34.3	<u> </u>	< 34.3		v	34.3	v	34.3	7	34.3	v	34.3	<u>v</u>	34.3	v	34.3	<u>12.</u>
Potassium	2160		1690	0 F		1350		1520	Ŀ	1080		1490	124	1830		1490	Į.
Selenium	> 3.02	_ <u>~</u> _	< 3.02	2 F	v	3.02	v	3.02	<u>~</u>	3.02	v	3.02	<u>~</u>	3.02	v	3.02	124
Sodium	•		21800			21100		21400	Ľ	20900		20800	<u> -</u>	20900		20400	i.
Vanadium	!!		= ×		<u>د</u>	=======================================	v	=	<u>v</u>	:	<u>v</u>	=	<u>v</u>	=	<u> </u>	=	<u> </u>
Zinc	< 21.1	_	< 21.1		v	21.1	v	21.1	F <	21.1	v	21.1	느	21.1	v	21.1	<u>i.</u>
TAL TESTICIDES COS (APL)					L	0233			×	.0233	L		ř	.0233			ī
4,4					v	034			v	.034			V	.034			
Bhc - Alpha					v	.0385			v	.0385			V	.0385			-
Bhc - Beta					v	.024			v	.024			V	.024			
Brc - Detta					v	.0293			v	.0293			<u>v</u>				
Bhc - Garrena (lindane)	•				v	.0507			v	.0507			<u> </u>				
Endomifian I					v	.023			v	.023			<u> </u>				
Endrin Aldehyde					v	.0285			v	.0285			<u> </u>	Ĭ			
Heptachlor					v	.0423	-		v	.0423			<u>v</u>	Ī			
Isodrin					¥	.0562			4	.0562			\dashv	.0562			Т
PAL SEMIVOLATILE ORGANICS (µg/L)																	
Bis(2-ethylhexyl) Phthalate	< 4.8				V	4.8			V	4.8			ㅐ	4.5			
																4	

12/7/95 2:55 PM

LOWER COLD SPRING BROOK SITE INVESTIGATION FORT DEVENS, MA

CSW-94-03X CSW-94-03X CSW-94-03X CSW-94-03X CSW-94-06X CSW-94-06X CSW-94-06X B913994 B9		71600 69600 < 4000 < 4000	
CSW-94-01X CSW-94-01X CS 6970-94 (Blured) (Blured)	PAL WET CHEMISTRY Alkalinity 66000 66000	Suitate Total Hardness Total Suspended Solids < 4000	OTHER

µg/L = micrograms per liter

<= less then

B = analyte found in method blank or QC blank as

well as the sample.

C = analysis was confirmed D = duplicate

F = filtered

I = low spike recovery is high

M = high spike recovery is high N = high spike recovery is low

U = stalysis is unconfirmed
V = sample was subjected to unusual
storage/preservation conditions

12/7/95 2:55 PM

ANALYTE	CSW-94-09X 69/20/94	5	CSW-AL-09X 0970/94		CSW-94-10X 99/2094	Ö	84.54.10X		NIL PAYORS	<u> </u>	SW-94-11X 0972194	u .	CSW-94-12X 09-2194	ð T	XX1-34-12X 0971.94	
			(Mered)				(filtered)				(Offerral)				(Blened)	
PAL METALS (ug/L)		•														
Aluminum	< 141	v	141	<u>></u>	141	>	141	F <	141	v_	141 F		402	>	141	Ŀ
Antimony	< 3.03		3.3	<u>v</u>	3.03		4 :1	<u>v</u>	3.03	v	3.03 F	<u>v</u>	3.03		4.02	Ľ.
Arsenic	5.97		4.05	<u>.</u>	4.69	<u>v</u>	2.54	٤.,	4.58		3.3 F	7.	8.74		3.52	12.
Barium	8.06		7.09		7.86		6.9	124	7.7		6.81 F	-	10.4		8.53	Ľ.,
Beryllium		v	~	<u>۷</u>	\$	v	s,	<u>~</u>	*	v	S	<u>v</u>	٠,	v	~	Ŀ
Cadmium	< 4.01	v	4.01	<u>~</u>	4.01	<u> </u>	4.01	<u>V</u>	10.4	v	4.01 F	<u>v</u>	4.01	v	4.01	14
Calcium	22700		22200	i.	23300		22000	[4	22800		21300 F	<u></u>	22800		21900	Ľ,
Chromium		v	6.02	<u>×</u>	6.02	<u>v</u>	6.02	<u>v</u>	6.02	v	. 6.02 F	v	6.02	v	6.02	124
Cobalt	< 25	V	25	<u>~</u>	25	v	23	<u>~</u>	23	<u>v</u>	25 F	v	25	v	22	Ŀ
Conner		v	8.09	<u>v</u>	8.09	٧	8.09	<u>~</u>	8.09	v	8.09 F	v	8.09	v	8.09	<u>[1,</u>
Iron			139		405		119	124	421		105 F	 -	1200		112	Ŀ
	< 1.26		1.26	<u> </u>	1.26	v	1.26	<u>F</u>	1.26	v		Ľ.	5.1	v	1.26	124
Memerium	3250		3170		3340		3160	Ĺī,	3250			£r.	3280		3140	<u>[1.</u>
Mangapese	84.3		72.2	<u> </u>	81.2		8.69	124	94.5		93.7 E	<u>.</u>	272		355	12.
Mercury		v	.243	<u>~</u>	.243	v	.243	<u>۷</u>	.243	v	.243 F	<u>v</u>	.243	v	.243	12.
Nickel	< 34.3	v	34.3		34.3	٧	34.3	<u>۷</u>	34.3	v	34.3 F	v	34.3	v	34.3	(1,
Potassium			1590	<u></u>	1770		1820	(L,	1260		_	<u> </u>	1700		1410	ഥ
Selenium	3.02	v	3.02	<u>v</u>	3.02	v	3.02	<u>v</u>	3.02	v	3.02 F	v	3.02	v	3.02	124
Sodium	~		20000	<u> </u>	20600		19600	124	20000			<u></u>	19800		19800	į,
Venedium			=	<u>v</u>	=======================================	v	11	<u>н</u>	=======================================	<u> </u>		<u>^</u>	11	v	=	jz,
Zinc	< 21.1		21.1	<u>v</u>	21.1	v	21.1	<u>∨</u>	21.1	٧	21.1 F	> <	21.1	v	21.1	щ
TAMES DESCRIPTION OF THE PROPERTY OF THE PROPE																
4 4'-ddd		L		L		L		ř	.0233	L						Γ
4,4-ddt								V	.034							
Bhc - Alpha								V	.0385							
Bhc - Beta								<u>v</u>	.024							
Bhc - Delta								<u>v</u>	.0293							
Bhc - Gamma (lindane)								<u> </u>	.0507							
Endosulfan I								<u> </u>	570.							
Endrin Aldehyde								<u> </u>	.0285							
Heptachlor Isodrin								/ V	.0562						•	
() SUI SEMINOI ATH & OBGANICS (118)									-			İ				
Rie?_ethylberyl) Phthalate	× 4.8	L		¥	4.8	L		ř	4.8	L		×	4.8			T
		ł														1





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LOWER COLD SPRING BROOK ANALYTICAL SURFACE WATER SAMPLE RESULTS

LOWER COLD SPRING BROOK SITE INVESTIGATION FORT DEVENS, MA

ANALYTE	CSW.94.09X 892894	CSW-94-09X CSW-94-16K 09/20094 09/20094 (filtered)	CSW-54-10X CSW-54-11X (D/1094 (B)1154 (B)1154	F11X CSW-94-11X CSW-94-12X 69-12X 69-	54 CSW-84-12K 54 092154 (filtered)
PAL WET CHEMISTRY					
Alkalinity	45000	46000	4100		0
Chloride	33000	33000	33000	33000	•
Suffate					
Total Hardness	00929	00929	00929		•
Total Suspended Solids	< 4000	< 4000	0009	37000	0
OTHER					
Total Organic Carbon (µg/L)					
NOTES:					

ug/L = micrograms per liter
<= bess than
B = analyte found in method blank or QC blank as
well as the sample.
C = analysis was confirmed
D = duplicate

I = low spike recovery is high
M = high spike recovery is high
N = high spike recovery is low
U = analysis is unconfirmed
V = analysis subjected to unusual
storage-breagavation conditions

ANALYTE	Û	CSW-94-13X IR023%	8	CSW-94-13X 0972784		SW-94-14X 98/1/94	Ö	CSW-94-14X #972/94		CSW-S4-16X 092284		SW-94.168		CSW-34-17X 09:22:54	Ö	X11-24-VX	
				(Mered)				(filtered)				(Altered)				(filtered)	
PAL METALS (µg/L)																	
Aluminum	v	141	v			7740	>	141	F	501	>	141	F	141	>	141	:-
Antimony	v	3.03			<u>v</u>	3.03	v	3.03	<u>v</u>	3.03	v	3.03	<u>r</u>	3.03		2.95	į,
Arsenic		3.84			12.	8.42	v	2.54	<u>.</u>	15.8	v	2.54	Ŀ	3.52	v	2.54	Ŀ
Barium		8.63		8.15	íz.	107		11.6	14	46.9		12.5	124	8.95		8.28	<u> </u>
Beryllium	v	~	v	•	<u>v</u>	\$	v	~	<u>v</u>	٠,	v	*	<u>۲۰</u>	•	v	•	۲.,
Cadmium	v	4.01	V	4.01		9.74	v	4.01	<u> </u>	4.01	v	4.01	<u>+</u>	4.01	v	4.01	ഥ
Calcium		24000		24000	12.	22300		7300	-	18000		17200	Ŀ,	22900		22800	Ľ.
Chromium	v	6.02	٧		le.	7	v	6.02	<u>v</u>	6.02	v	6.02	<u>r.</u>	6.02	v	6.02	ᄕ
Cobatt	v	25	У		<u>v</u>	25	v	23	<u>v</u>	23	<u> </u>	22	<u>r</u>	25	v	52	μ,
Copper	v	8.09	v	8 .09	12.	60.5	V	8.09	<u>×</u>	8.09	v	8 :06	<u>v</u>	8.09	v	8.09	Ĺz,
Iron		423		115	12.	7800	v	38.8	_	0809		438	12.	474		249	Ľ
Lead	v	1.26	v	1.26	12.	140		1.41	-	3.36	V	1.26	<u>v</u>	1.26	v	1.26	[],
Magnesium		3450		3460		2020		119	12.	3420		3300	<u>(</u> 1,	3270		3270	Ŀ
Manganese		101		96.5	12.	09		7.88	14.	4480		217	ഥ	102		8	12,
Mercury	v	.243	v	.243	<u>v</u>	.243	v	.243	<u>v</u>	.243	v	.243	<u>r</u> .	.243	v	.243	12.
Nickel	v	34.3	v	34.3	<u>×</u>	34.3	v	34.3	<u>v</u>	34.3	v	34.3	<u>~</u>	34.3	v	34.3	Ŀ
Potassium		2110		2010	£e.	2860		1540	٤.	2500		2540	124	1500		1460	Ľ
Selenium	v	3.02	v		<u>×</u>	3.02	v	3.02	<u>v</u>	3.02	v	3.02	<u>V</u>	3.02	v	3.02	Ŀ
Sodium		19600				44700		46200	í.	32800		32800	12,	20500		20600	12.
Vanadium		11	v		14	16.4	v	==	<u>×</u>	11	v	=	<u>v</u>	11	v	11	Ŀ
Zinc	v	21.1	v	21.1	-	240	V	21.1	<u> </u>	21.1		21.1	¥	21.1	v	21.1	Ŀ
PAI, PESTICIDES/PCBS (u.e/L.)		-								 - -							
4.4'-ddd	¥	.0233			L				L				H				Г
4,4"-ddt	v	.034															
Bhc - Alpha	v	.0385															
Bhc - Beta	v	.024															
Bhc - Defta	v	.0293															
Bhc - Gantma (lindane)	v	.0507															
Endosulfan I	v_	.023															
Endrin Aldehyde	v .	.0285															
Heptachlor	<u> </u>	.0423												_			
Isotrin	┙	7900			4				\downarrow		4		\dagger				T
PAL SEMIVOLATILE ORGANICS (44/L)											İ		\dashv				
Bis(2-ethylhered) Phthalate	V	4.8			\vee	4.8			⊻	4.8	\sqcup		\dashv	4.8			
			i									l			•		I

LOWER COLD SPRING BROOK SITE INVESTIGATION FORT DEVENS, MA

ANALYTE	CSW-94-13X 1902294	CSW-54-13X 09/2254 (filtered)	CSW-94-14X CSW-94-14X 6972.94 (filtered)	4X LWW.94.16X 4 9972294	CSW-94-16X 09/11/94 ((fitered)	6972.94.17X CSW-94.17X 0972.94 (Blerrd)	¥
PAL WET CHEMISTRY							
Alkalinity Chloride	\$1000 33000		13000	33000		47000 33000	
Sulfate Total Hardness	71600		57200	62400		67200	
Total Suspended Solids	< 4000		212000	146000		0006	
OTHER			THE COMMENT OF STREET OF S				
Total Organic Carbon (µg/L)							П
NOTES:							

ug/L = micrograms per liter

<= kes then

B - snalyte found in method blank or QC blank as

well as the sample. C = analysis was confirmed

I - low spike recovery is high

M = high spike recovery is high N = high spike recovery is low

U = analysis is unconfirmed
V = sample was subjected to unusual
storage/preservation conditions

LOWER COLD SPRING BROOK SITE INVESTIGATION FORT DEVENS, MA

ANALYTE	CSW-94-1EX BOLLSH	8	CSW-94-18% 0972394 (Blend)		CSW 94-19% 690294	đ T	554-54-15X 692254 (filtered)	5	CSW. 94.20X BAZZSA	8-0	SW-94-JBX 09/2294 (filtered)		CSW: 44.167 092034	ë -	28W-94-26X 097094 (Blerré)	×
PAL METALS (usf.)																
Aluminum	41 >	v	Ξ	F	141	v	141 F		167	v	141	¥ H	141	v	141	124
Antimony	< 3.03		3.04	<u>v</u>	3.03	v	3.03 F	٧	3.03	v	3.03	<u>r</u>	3.03	v	3.03	Ĭ.
Arrenic	2.98	<u>v</u>	2.54	ii,	3.73	v	2.54 F	v	2.54	v	2.54	<u>v</u>	2.54	٧	2.54	124
Barium	11.5		12.5	<u></u>	8.95		8.18 F		16.8		16.5	į,	12.8		9.44	ᄕ
Beryllium			~	٧ <u>۱</u>	٧,	v	5		80	v	~	<u>v</u>	~	v	'n	(I,
Cadmium	< 4.01	v	4.01	<u>v</u>	4.01	<u> </u>	4.01 F	v	4.01	v	4.01	<u>۷</u>	4.01	v	4.01	į,
Calcium	18400		17500	<u> </u>	22300		22500 F		21300		21100	14	17300		16900	12,
Chromium		v	6.02	<u>v</u>	6.02	v	6.02 F	v	6.02	v	6.02	<u>۷</u>	6.02	v	6.02	Ŀ
Cobat	< 25	v	23	<u>v</u>	25	v	25 F		25	v	22	<u>н</u>	23	v	25	Ŀ
Conter		v	8.09	V	8.09	v	8.09 F	v	8.09	v	8.09	<u>~</u>	8.09	v	8.09	ы
Ima	30\$		873	124	562		105 F		1090		172	į.	804		150	<u></u>
Lead	< 1.26	v	1.26	<u>۷</u>	1.26	v	1.26 F		1.41	v	1.26	<u>۷</u>	1.26	v	1.26	į.
Mamerium	3200		3300	Œ	3200		3230 F		2820		2810	14	2900		2870	Ŀ
Manganete	278		442	Ŀ	128		86.8 F		119		801	<u> </u>	613		222	Ľ,
Mercury		v	.243	<u>~</u>	.243	v	.243 F	v	.243	v	.243	<u>₹</u>	.243	v	.243	[1,
Nige	< 34.3	v	34.3	<u>۷</u>	34.3	v	34.3 F	v	34.3	v	34.3	<u>.</u>	34.3	v	34.3	<u>[2.</u>
Potassium	2040		2200	Ľ,	1580				2620		2160	Įž.	1730		1850	ſz.
Selenium	< 3.02	v	3.02	<u>Y</u>	3.02	٧	3.02 F	v	3.02	v	3.02	<u>r</u>	3.02	v	3.02	į,
Sodium	29100		32100	124	19900			•	21200		20900	14	22900		22600	Ŀ
Vanadium		v	=	<u>v</u>	==	v	11 F <		11	v	=======================================	<u>к</u>		v	=	Ľ
Zinc	< 21.1	v	21.1	F	21.1				21.1	v	21.1	F	21.1	v	21.1	i.
PAT PERTICINES/PCRS (116/L.)																
4 4 444	< 0233			H		L		v	.0233			┝				Г
4 4'-d#							•	v	.034							
Bhc - Aloha	<0385							v	.0385							
Bhc - Beta								v	.024							
Bhc - Delta	< .0293							v	.0293							
Bhc - Gamma (lindane)	•							v _	.0507							
Endosulfan I								٧	.023							
Endrin Aldehyde								v '	.0285							
Heptachlor								v	.0423							
Isodrin	< .0562	_		┥				V	.0562			\dashv				٦
PAL SEMIVOLATILE ORGANICS (MVL)																
Bis(2-ethylhexyl) Phthalate	11			>	4.8			>	4.8			>	4.8			
				 		_		١.		ı	: 		'		١.	

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LOWER COLD SPRING BROOK SITE INVESTIGATION FORT DEVENS, MA

ANALYTE	CSW-34-1EX 19/2/294	CSW-94-18X CSW-94-19X 0972294 0972294 (filtered)	CSW-94.19X	(SW-94-18X CSW-94-26X (SW-94-26X 09/21/94 09/21/94 (filtered)
PAI, WET CHEMISTRY			******	3,000
Alkalinity Chloride	34000	47000 33000	00099	00099
Sulfate Total Hardness	56400	00089	0019	54400
Total Suspended Solids	< 4000	< 4000	00151	
OTHER				
Total Organic Carbon (µg/L)				
NOTES:				

µg/L = micrograms per lifer <= less than

B = snalyte found in method blank or QC blank as

well as the sample.

C = analysis was confirmed

D = duplicate

I = low spike recovery is high M = high spike recovery is high

N = high spike recovery is low

U = analysis is unconfirmed
V = sample was subjected to unusual
storage/preservation conditions

LOWER COLD SPRING BROOK SITE INVESTIGATION FORT DEVENS, MA

													00000				000000000000
ANALYTE	8 -	CSW-94-17X B770/94	5	KT244.VXI MOTIO		ESW 94.28X 882294	Ö	24.34.38X 1972.54 (films)		XICANASIX POIDA	· ·	58.21.94 09.21.94 (Okered)		CNUSACIIX	<u> </u>	SW-94-33X 09/21/94 (filtered)	×
(provide a state a state																	
TAL METALS (MPL)	V	141	V	141	× 1	141	v	141	L	3150	×	₹	F	141	×	141	F
Authurum	<u>, v</u>	102	v	3.03	<u> </u>	3.03		3.12	<u>۷</u>	3.03	v	3.03	<u>г</u>	3.03		2.95	<u>,,,</u>
Amunony	<u> </u>	2 \$4	' <u>v</u>	2.54	<u> </u>	2.54	v	2.54	£ .	79.3	v	2.54	<u>v</u>	2.54	v	2.54	ī
Artenic	<u>/_</u>	45 0	,	× ×		90		8.56	- 12	179		7.01	Ľ	7.4		8.18	Ľ
	_\	.	V		<u> </u>	•	v	~	V	s.	v	∾	<u>,</u>	•	v	S	Ŀ
Beryllium	<u>/_v</u>	7 7	, v	4.01	· V	4 .01	V	10.4	V	4.01	v	4.01	<u>^</u>	4.01	v	4.01	Ľ,
	<u>, </u>	00291	,	16400	. 12	17800		17500	-	19700		16400	Ŀ	16400		16400	Ĺ.
Calcium		209	v	6.02	<u> </u>	6.02	v	6.02	- 12	6.33	v	6.02	<u>^</u>	6.02	v	6.02	Ľ,
Creomon	/ V	25	· v	23	<u> </u>	22	v	22	<u>v</u>	25	v	25	<u>۷</u>	25	٧	22	į,
Coord	<u> </u>	2 0	· <u>v</u>	808	<u> </u>	8.09	v	8.09	<u>v</u>	8.09	v	8.09	<u>۷</u>	8.09	v	8.09	Ħ
	,	38.	,	109	- [1.	323		151	<u></u>	40300		700	į,	490		247	Ŀ
LOUI.	V	1.26	V	1.26	124	3.15	v	1.26	<u> </u>	32.8		10.6	Ľ	5.97	v	1.26	Ŀ
	,	2800	,	2790	į į	3050		3020	<u> </u>	3640		2810	Ŀ	2790		2820	ſĽ,
Magnesium		300		5 2	, LL	181		132		6320		151	Ŀ	171		171	ij,
Mangancie		243	V	243	V	243	v	243	V	.243	٧	.243	<u>ب</u>	.243	v	.243	Į,
Mercury:	, _V	34.3	· v	34.3	V	34.3	٧	34.3	<u>v</u>	34.3	v	34.3	<u>₹</u>	34.3	v	34.3	Ŀ
inickel	·	2080		1910	£1.	1650		1750	<u></u>	2720		1530	F	1760		1800	Ľ
roussium	V	3 02	V	3.02	<u>v</u>	3.02	v	3.02	<u>v</u>	3.02	v	3.02	<u>н</u>	3.02	v	3.02	Ľ
Seignain	,	22300	,	22200	. (2.	26100		25900	ſĿ.	23000		23000	ш	22500		22600	ഥ
Sodium	\	11	V	=	· <u>11</u>	=	٧	=	<u>v</u>	=======================================	v	11	<u>v</u>	11	v	=	į,
Vanadium	/ V	21.1	, v	21.1	· V	21.1	v	21.1	<u> </u>	83		21.1	я. ^	21.1	¥	21.1	F
									_								
PAL PESTICIDES/PCBS (MUL)	Ļ	0000	L		F		L		╀		L		ř	.0233	L		
4,4-466	/ V	034											v	.034			
Ploc - Ainha	v	.0385											V	.0385			
Bhc - Beta	V	.024											<u> </u>	.024			
Brc - Deita	v	.0293											V	.0293			
Bhc - Gamma (lindane)	ν.	.0507											<u> </u>	.0507			
Endoeuffan I	V	.023											<u> </u>	570.			
Endrin Aldehyde	v	.0285											<u>/ \</u>	.0283			
Heptachlor	<u> </u>	.0423											′ V	.0562			
lsodrin	4	7900.			$\frac{1}{2}$				╀		-		1		-		
PAL SEMIVOLATILE ORGANICS (48/L)									4		ļ		ľ	ļ	ļ		
Bis(2-ethylhexyl) Phthalate	\vee	4.8			$\stackrel{\vee}{\dashv}$	4.8	4		ᅬ	8.4	4		\forall	8.4	_		
							4		•							4	



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LOWER COLD SPRING BROOK SITE INVESTIGATION FORT DEVENS, MA

CSW-94-31X	35000	\$1200 4000	
CSW-84-31X 09-21-54	32000	63200 380000	
CSW-34-27X	35000	\$6000 < 4000	
CSW.54.17X CSW (0) **SPGC*** (0)	35000	\$1600 < 4000	
ANALYTE	PAL WET CHEMISTRY Alkalinity Chloride	Sulfate Total Hardness Total Suspended Solids	OTHER Total Organic Carbon (µg/L)

µg/L = micrograms per liter

<= less than

B = enalyte found in method blank or QC blank as

well as the sample. C = analysis was confirmed

D = duplicate F = fittered

I = low spike recovery is high

M = high spike recovery is high

N = high spike recovery is low

U = analyzis is unconfirmed
V = sample was subjected to unusual
storage/preservation conditions

LOWER COLD SPRING BROOK SITE INVESTIGATION FORT DEVENS, MA

AMAIAMA	CSW-94-33X	×.	Š	SW-94.13X 697.154	U	SW-94.34% 897184	ซ	CSW-34.3 CK		(SW-34.35X 097274	U	CSW-94.35% 0972.94		85W-98-69H 07/18/95	9H S
			8	(Mtered)				(filtered)				(Distress)			
PAL METALS (µs/L)													ŀ		
Aluminum	1370		\ \ \	141		374	>	141	ᅩ		٧	141	<u>v</u>	112	
Antimony	< 3.03		,7		<u>×</u>	3.03	v	3.03	<u>ب</u>	3.03		4.11	F.	8	
Archic	\$		v	_		5.22	v	2.54	<u>v</u>	2.54	v	2.54	Ŀ	8.94	X
Rarium	89.9				Ľ	13.3		7.98	ഥ	9.35		8.37	Ŀ	18.1	
Berelina			v		۷	*	v	\$	F	v	٧	~	12.	1.21	
Cadmium	< 4.01		٠ ٧		٧	4.01	v	4.01	<u>r</u>	4.01	v	4.01	<u>.</u>	6.78	
Calcium	17800		=		<u> </u>	16400		15500	Ŀ	11200		11200	Ŀ	24200	
Chromina	19.7		· •		<u>.</u>	6.26	v	6.02	ᅜ		٧	6.02	<u>~</u>	16.8	
Total			v	25	٧	25	v	22	<u>r</u>		٧	22	<u>ب</u>	25	
Connet	> 8.09		~ v		٧ <u>ټ</u>	8.09	v	8.09	<u></u>		٧	8.09	<u>,</u>	18.8	
Imm	19200		••		-	2120		429	í.	389		195	<u></u>	1700	
7.0	12.9		44		Ľ.	4.56	v	1.26	Ľ	2.71	v	1.26	<u>~</u>	4.47	MP
Magnetitu	3210		7		-	2830		2660	Ŀ	1300		1310	12,	3620	
Management	1870	_			-	211		157	12.	46.2		39.1	i.	196	
Manufactor			v	243	٧	.243	v	.243	<u>r</u>	.243	v	.243	<u>r</u>	-:	
Nickel	< 34.3		ν.		<u>۷</u>	34.3	v	34.3	<u>ب</u>	34.3	٧	34.3	F	32.1	
Potaesium	2150		~		Ľ.	2020		1960	ഥ	1340		801	<u>۲</u>	1240	
Selenium	< 3.02		۳ ۷		<u>v</u>	3.02	v	3.02	<u>r</u>		v	3.02	<u>.</u>	2.53	
Sodium	23000		7	2500	Į+-	22600		22000	<u> </u>	24700		24900	52.	20300	
Vanadiim	\ 11		v	=======================================	V	11	v	11	<u>ب</u>		v	11	<u>~</u>	27.6	
Zinc	29.6			21.1	V	21.1	v	21.1	F		<u> </u>	21.1	۲ ۲	82	M
Chail Semestration and Land															
A A'AAA					Ľ	.0233			十		L		ř	1800.	
4 4'-dt					<u> </u>	.034							<u> </u>	.002	
Bhc - Alpha					<u> </u>	.0385								.0182	ပ
Bhc - Beta					<u> </u>	.024				•			<u> </u>	900.	
Bhc - Delta					v	.0293			_				<u> </u>	.0034	7
Bhc - Gamma (lindane)					v	.0507							<u> </u>	.0025	z;
Endosulfan I					V	.023							<u> </u>	.0025	Z
Endrin Aldehyde					<u> </u>	.0285							<u> </u>	.050	;
Heptachlor					v	.0423			•					.0034	>
Isodrin					Y	.0562			4		4		\dashv	.0025	
PAL SEMIVOLATILE ORGANICS (48/L)									į						
Bis(2-ethylhexyl) Phthalate	× 4.8				<u> </u>	4.8	Ц		}	4.8	Ц		>	7.7	Λ

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LOWER COLD SPRING BROOK SITE INVESTIGATION FORT DEVENS, MA

ANALYTE	CSW-94-33X CSW-94-33X 89721.94 (Biered)	CSW-94.34X 09:21:54	CSW-94.347 (FSW-94.35X (CSW-94.34X (Bltered))	CSW-94.18X SSW-95.49H 947.154 9771035 (Ditered)
PAL WET CHEMISTRY		00000	19000	46600 F
Alkalinity	33000	33000	33000	42000
Chloride	33000	2000		13000
Sulfate		\$0400	31600	73900
Total Hardness	22000	00000	4000	× 4000
Total Suspended Solids	192000	332000		
OTHER				1 3430
Total Organic Carbon (µg/L)				
NOTES:				

 $\mu g/L$ = micrograms per blor < = less than B = analyte found in method blank or QC blank as

C - enalysis was confirmed well as the sample.

D = duplicate

I = low spike recovery is high F - filtered

M = high spike recovery is high
N = high spike recovery is low
U = analysis is unconfirmed
V = sample was subjected to unusual
storage/preservation conditions

LOWER COLD SPRING BROOK SITE INVESTIGATION FORT DEVENS, MA

ANALYTE	ASS.	S8W-35-09H 97.11095	_	15 to	85W-95.091 07/10/55		88	NW. St. Off Philosophy (filtered)		88W-95-093 67/1875	2 X		SSN-34.03 871895 (Blend)	2		SEW-25. 693 077.075 (duplicate)	7 ~	.	SSW-95-093 87/1095 (duplicate/filtered)	Ę
PAI.METAIS(ue/L)																				
Aluminum	v	112	F	V	112	┢	v	112	F			>	112	ы	<u>×</u>	112	Ω	>	112	DF
Antimone	v	9	<u></u>	v	9	_	v	ક	<u>~</u>	8		v	8	Ŀ	<u> </u>	8	D	v	8	Ä
Account		4.98	E		19.9	X	v	2.35	FM	11.0	×		3.89	FM		4.38	DM		2.54	DFM
Bering		9	(L		21.6	_		18.3	14	7.0			7.75	ш		8.22	Ω		7.05	'n
Berdlinn	v	1.12	£ .		1.47			1.39	í.	1.19	_		1.27	iz,		1.31	Ω		1.21	DF
Cadmin	v	6.78	, <u>r</u>	v	6.78		v	6.78	<u>.</u>	6.78		٧	6.78	!	v	6.78	Ω	v	6.78	DF
Celcium		24100	Ľ	60	30800		~	00067	<u> </u>	23800	0		25900	ш		26900	Ω		24300	D.
Chromium	٧	16.8	ī	v	16.8		v	16.8	<u>.</u>	16.8	•	٧	16.8	Ŀ	v	16.8	۵	v	16.8	υĘ
Tedo?	٧	23	<u> -</u>		23		v	25	<u></u>	25		٧	22	Ĺ	<u> </u>	23	Ω	v	22	Ų.
Count	٧	8.8	Ŀ	v	18.8		v	18.8	<u>v</u>	18.8		٧	18.8	Ľ	<u> </u>	18.8	Ω	v	18.8	DF
Cupper		437	12.		3470			1830	<u>v</u>	3.77			167	<u>iz</u> ,		178	Ω	v	77.5	DΕ
Total Land	٧	4.47	FMP	v	4.47	₩.	٧	4.47	FMP	4.4	MP /	v	4.47	FMP	<u>۷</u>	4.47	DMP	_	4.47	DFMP
Memorium		3610	<u>;.</u> ,		3400		•	3240	Ľ.	3580	_		3850	ĹĽ,		4010	Ω		3630	ŭ
Menoence		99.9	Ĺī.,		704			489	딾	45.4	_		146	ı		%	Q		43.9	D.
Marchine	v	-	<u>L</u>	v	Ξ.		v	-:	<u>~</u>	- :		٧	- :	į.	V	=:	Ω	v	- :	E C
Mercui y	v	32.1	12.		32.1		٧	32.1	<u>v</u>	32.1		٧	32.1	F	٧	32.1	D	v	32.1	DΕ
Potentiim	٧	1240	į,		1380			1240	<u></u>	124	_	v	1240	Ŀ	<u> </u>	1240	Ω		1340	υĘ
Selenim	v	2.53	<u> </u>	v	2.53		v	2.53	<u>.</u>	2.5		v	2.53	ĮZ.,	v	2.53	0	v	2.53	DΕ
Sodium		20500	<u> </u>	6	33300		•	31800	<u> </u>	20300	0		21900	<u> </u>		22600	Ω		20700	Į,
Venedit	٧	27.6	Ŀ,	v	27.6		v	27.6	<u>.</u>			v	27.6	Ŀ	v	27.6	Ω	v	27.6	Ę.
Zinc	v	18	FMI		23.8	MI		18.7	FMI	- [M	_	28	E		æ	DMI	_	82	DFMI
ratiresticinestres (4g/L)					00833	5			ľ	.008		L			L			L		
****				· ·	.0025				<u></u>		~									
The Ainha					.021	ပ				.0025	~									
Bhe - Beta				· v	6600				<u> </u>	600.	6									_
Bhc - Defta				v	.0034					800.										
Bhc - Gamma (lindane)				۳.	.00318	3			<u> </u>	.0025										
Endosulfan I					.0025	z			<u> </u>	.0025										
Endrin Aldehyde				· ·	.0504	;			-	.0921										
Heptachlor					.00358	 >				S 5										
Isodrin			٦	V	.0025	1				.00848					4			4		
PAL SEMIVOLATILE ORGANICS (µg/L)																				
Bis(2-ethylhexyl) Phthalate				v	7.7	Λ			Ť	7.7	>	\sqcup			V	7.7	B	Ц		
											•									_

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LOWER COLD SPRING BROOK SITE INVESTIGATION FORT DEVENS, MA

Analytie grw.95.09H	160.29.4051 65 0771695	SSW.95-091 67/UN95 (Blured)	85W.95.031 770 78 (fil	SSW.25.093 (58W.38 1770 SSW.30 (Mirror) (480)	SSW-95-093 SSW-95-093 07710-95 b7710-95 (duplicate) (duplicate)	16 (Fred)
PAL WET CHEMISTRY			1200			
Alkalinity	70800 FV		44200 rv		_	
Chloride	\$7000 V		42000 v			
Sulfate	V 00100 V		V 0000		00000	
Total Handness	89500		4			
Total Suspended Solids	< 4000	Ť	< 4000			
OTHER	*****		1340		150 D	
Total Organic Carbon (µg/L)	3650		O-CI			
NOTES						

ug/L = micrograms per litter <= less than

B = analyte found in method blank or QC blank as well as the sample.

C = analysis was confirmed
D = duplicate
F = filtered

LOWER COLD SPRING BROOK SITE INVESTIGATION FORT DEVENS, MA

ANALYTE	•	CSW-94-04% 09/19/94	•	CSW-94-04X 097394		CSW-94-055 09/1994	X _	X50.46.W81 69/21/60	ğ _y :	g e e	(20 M M OS)	3	CSW-94-05X 09/19/4	£05X	-	CSW-94-06X 093354	J	1911994 1911994 (Memod)	×	
PAL METALS (ue/L)				(Castanna)																
Aluminum	L	1070	\ <u>v</u>	141	F	1970	r	4740	Ya a		141	F	141		DE DE	208	v	14	12.	
Artimony	٧	3.03	v	3.03	<u>r</u>	< 3.03	v	3.03			.03	·	3.0		₩ ×	3.03	v	3.03	Ĺ.,	
Arsenic	v	2.54	v	2.54	Ŀ	5.54		14.1			.54	<u>.</u>	< 2.5		DF /<	2.54	<u>v</u>	2.54	12.	
Barium		42.7		27.8	Ŀ	65		136			15.4	(4	33.		<u>۲</u>	29		26.7	14	
Beryllium	٧	*	v	٠	<u>r</u>	۸.		\$			~	·	×		DF /	8	v	~	Ĺ.	
Cadmium	v	4.01	v	4.01	<u>v</u>		<u> </u>	4.01			10.1	<u>.</u>	A.0.4.0		DF <	4.01	v	4.01	14	
Calcium		11000		10600	ഥ	12400		1450			700	<u> </u>	114		<u></u>	11600		11800	Ŀ	
Chromium	v	6.02	v	6.02	<u>د</u>		<u>v</u>	6.02			.02	<u> </u>	× 6.0		DF <	6.02	v	6.02	í.	
Cobalt	v	25	v	25	<u>r</u>			44.3	V		25	ᄕ	23		DF <	25	v	22	14	
Copper	v	8.09	v	8 :09	<u>r</u>			8.94			.09	<u>.</u>	8.0		OF.	8.09	v	8.09	124	
Iron		0899	v	38.8	Ľ	5770		1400			124	12.	10		DF	629		124	í.	
Lead	. V	1.26	v	1.26	14	10.1	-	27.3	<u>×</u>		.26	<u>٠</u>	> 1.2		¥	3.58	v	1.26	Ľ,	
Magnesium		1290		1260	Ĺ	1470		1770			400	뜨	137		DF.	1460		1440	i.	
Manganese		1450	_	195	Ľ,	1940		6050			185	<u> </u>	33		DF	323		224	ji,	
Mercury	V	.243	v	.243	<u>۲</u>		V	.243			243	<u>د</u>	.24		DF ~	.243	v	.243	(ii,	
Nickel	v	34.3	v	34.3	<u>v</u>			42.1	•		4.3	٧ <u>۲</u>	34.		다 >	34.3	v	34.3	Ŀ,	
Potassium		1360		1560	[L	1820		2500	Ω		710	<u>ئ</u> ـــ	180		DF.	1830		1630	12.	
Selenium	v.	3.02	v	3.02	<u>~</u>			3.3			.02	<u>.</u>	3.0		다 >	3.02	v	3.02	ш,	
Sodium		15000		15000	(۲,	15900		1580	0	=	200	<u> </u>	158		DF.	19400		19800	Ŀ	
Vanadium	v	==	v	=	<u>r</u>		<u>~</u>	=======================================	À	v	=	<u>.</u>			₽ -	=	v	=	íı.	
Zinc		33.9	v	21.1	띱	112	_	187	A	`\ v	1.1	٠ ۲			OF ~	21.1	┙	21.1	۲.	
PAL PESTICIDES/PCBS (µg/L)																				
DDD	_																			
DDT									•											
Bhc - Aipha									*****											
Bhc - Beta							-													
Bhe - Delta																				
Bhc - Gamma (lindane)												,								
Endosulfan I																				
Endrin Aldehyde							_													
Heptachlor																				
130cm III	4		\perp		1							-			1				Τ	
PAL SEMIVOLATILE ORGANICS (4g/L)	_	101	\perp		۲	48		19	4			-			+	4.5			T	
Sis(2-emyinexyi) rmmalate	4	21			1	,	1	;	1			-			1);;			1	



12/6/95 10:25 AM

LOWER COLD SPRING BROOK SITE INVESTIGATION FORT DEVENS, MA

AWALIYTE	CSW-94.04X 09/19/94	CSW 54.04X 19/19/94 (Blered)	1661160 350-16-MSC	(SW-94-06X (9919)94 (duplicate)	CSW 94 057 1991 994 (Btered)	CSW 94.05X (97.974 (dupfletend)	PS/GT/60 X9/TF6/MSCI	(SW-94-1657 1941994 (filtered)
PAI. WET CHEMISTRY							2000	
Alkalinity Chloride	15000 27400		13000	13000 31800	0		33000	
Sulfate Total Hardness Total Sulfate	32400		37600	48000	D		34800	
OTHER								
Total Organic Carbon (µg/L)								

NOTES

ug/L = micrograms per liter

< = less than

B = analyte found in method blank or QC blank as well as the sample.
C = analysis was confirmed
D = duplicate

1 - low spike recovery is high

M = high spike recovery is high N = high spike recovery is low

U = analysis is unconfirmed

V = sample was subjected to unusual storage/preservation conditions

LOWER COLD SPRING BROOK SITE INVESTIGATION FORT DEVENS, MA

									_								
ANALYTE	250.34.07X 091.934	ξ,	154 F. O.	K	ËŠ	SU-91-21% 097-094	gee	902094 902094 (Mered)		SW 24.14X 09/2004		997.054 097.054 0163.450		X07767		092154 (Ottered)	×
PAL METALS (ue/L)																	
Aluminum	141			Ŀ	Ĩ	Γ	V	141	F	710	Ľ	141	드	74600	ert	141	4
Artimony			< 3.03		د د		٧	3.03	<u>v</u>	3.03		3.66	(L)	2.68	V	3.03	<u> </u>
Arsenic	< 2.54			14		_		11.4	į,	19.3		7.78	Œ,	93.2		3.09	į,
Barium	25.9		24.9			*		12	<u> </u>	52.5		47.1	12,	387		14.5	<u>ı.,</u>
Beryllium			~	į.	v	~	v	~	<u>к</u>	~	v	٠,	<u>.</u>	S	V	\$	14
Cadmium	< 4.01		> 4.01	<u> </u>	v	10.	v	4.01	<u>v</u>	4.01	v	4.01	Ŀ	77	V	4.01	!
Calcium	11600	_	11500	<u>r</u>	7	650		7290	ഥ	8310		8490	Ŀ	38800		14400	1
Chromium				ഥ	v		٧	6.02	<u>к</u>	6.02	v	6.02	Ŀ	187		6.02	Ľ
Cobatt	< 25		< 25	12,	v		v	23	<u>ب</u>	22	v	. 22	Ľ	75	v	25	<u></u>
Copper	_			į.	96		v	8.09	ï	8.97	V	8.09	Į.	194	<u> </u>	8.09	1
lron	332	•	115	Ľ.	Ė	710		1680	í.	6320		158	14	126000		3060	1
Lead	1.52		< 1.26		~	9.0		1.52	Įž,	18.2	<u></u>	2.93	Ľ	370		1.41	ш
Magnesium .	1430		1410	H		86/		517	[24	1450	_	1300	<u>[1.</u>	29600		2570	Ľ
Manganese	226		204		**	150		324	14	1190		973	ш	4250		920	ഥ
Mercury				_	`: V		v	.243	<u>v</u>	.243	v	.243	į.	.426	V	.243	ï
Nickel	< 34.3	<u>-</u>	< 34.3		×		v	34.3	×	34.3	v	34.3	íL,	185	v	34.3	14
Potassium			1730		=	570		1250	<u> </u>	2080		1710	ţ <u>ı,</u>	14000		2250	Ħ
Selenium	< 3.02		< 3.02	124	, 3		v	3.02	<u>.</u>	3.02	v	3.02	<u>~</u>	3.02	٧	3.02	14
Sodium	19000	_	19000		22	2005		22000	ᄕ	18000		18600	ſĿ,	24000		22300	i.
Vanadium	=======================================	<u> </u>			v		v	=	<u>v</u>	=	v	Ξ	iz,	162	v	=	12,
Zinc	< 21.1	Ì	< 21.1		°	1.2		42.9	11	280	_	277	띱	935	겍	21.1	٢
PAL PESTICIDES/PCBS (µg/L)																	
aaa																!	
DDT																	
Bhc - Alpha																	
Bhc - Beta							•										
Bhc - Delta																	
Bhc - Gamma (lindane)																	
Endosulfan I																	
Endrin Aldehyde																	
Heptachlor						· · · · · · · ·											
PAT SEMINOI ATHE ODCANICS (LEG.									1		ļ		1		┨		Γ
FALSEMIYOLATILE ONGANICS (HELL)	•	T					l		ŀ	40	L		f	91	F		I
Bis(z-cmyinexyi) rnualate	} 								4	o P	⇃		1	2.7	$\frac{1}{2}$		1



LOWER COLD SPRING BROOK SITE INVESTIGATION FORT DEVENS, MA

ANALYTE	CSW-94-07X 09(19994	CSW-94-07X 0913944 (filtered)	SW-94-21X 09/20:94	CSW-94-71X D71094 (filtered)) XPT-96-XXS	(SW-94-21X 09:20:84 (filtered)	SW-94.30X 09/21/54	CSW-94-30X 09/21/94 (filtered)
PAL WET CHEMISTRY					0000		20000	
Alkalinity Chloride	17000 33000		24000 28500		18700		33000	
Sulfate Total Hardness	34000		31000		36000		92400 3950000	
Total Suspended Solids	< 4000 ×		20015					
OTHER						-		
Total Organic Carbon (μg/L)								

NOTES:

µg/L = micrograms per liter <= less than

B = analyte found in method blank or QC blank as

well as the sample.

C = analysis was confirmed

D - duplicate

I = low spike recovery is high F = filtered

M = high spike recovery is high N = high spike recovery is low

U = analysis is unconfirmed
V = sample was subjected to unusual
storage/preservation conditions

LOWER COLD SPRING BROOK SITE INVESTIGATION FORT DEVENS, MA

	*******				200000000000000000000000000000000000000				
		SSW-95-09K		e)	SSW-98-m9K	v	•••	RSW-96-09K	·
ANALYTE		\$7/10/95			67/10/95 (duplicate)			(filtered)	
PAL METALS (μg/L)									
Aluminum		223					<u>~</u>	112	Œ,
Antimony	V	8					v	જ	ĮĽ,
Arsenic		63.4	Σ					26.7	Æ
Berium		30.5	-					25.1	ſĽ,
Beryllium		1.15						1.15	ĮĽ,
Cedmium	v	6.78					v	6.78	F
Calcium	-	22500						22500	E,
Chromium	v	16.8					v	16.8	Ŀ
Cobatt	v	22					v	23	ഥ
Copper	v	18.8					v	18.8	Ŀ
lion		23500						9250	ŗ.,
Lead	v	4.47	MP				<u>v</u>	4.47	FMP
Magnesium		2300						2290	Ŀ
Manganese		845						835	ഥ
Mercury	v	-:					v	- :	į,
Nickel	v	32.1					<u> </u>	32.1	ഥ
Potassium		1610						1420	Ŀ
Selenium	V	2.53					v	2.53	Ŀ
Sodium		27900						28000	Ŀ
Vanadium	v	27.6					v	27.6	Œ,
Zinc	v	8I	M				✓	<u></u>	E
PAL PESTICIDES/PCBS (µg/L)									
DDD	>	1800.			.0178	2			
DDT	v	.0025			.00314	DO			
Bhc - Alpha		4440	ပ		.00479	DO			
Bhe - Beta	v	.009			.0119	20			
Bhc - Delta		.0037	Þ	V	.0034	Δ			
Bhc - Gamma (lindane)		.00423	3		.00553	250			
Endosulfan I	v	.0025	z		.00436	N N	_		
Endrin Aldehyde		.0639	Þ	v	.0504	۵			
Heptachlor	V	.002\$.0034	D			
[sodrin	<u> </u>	.0025		V	.0025	۵			
PAL SEMIVOLATILE ORGANICS (µg/L)	(
Bis(2-ethylhexyl) Phthalate	>	7.7	Λ						

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LOWER COLD SPRING BROOK SITE INVESTIGATION FORT DEVENS, MA

ANALYTE	SSW-95-09K 87/10/95		85W-95.09K 07/10.95 (duplicate) (Atered)
PAL WEI CREMISIAI	00163	123	
Alkalinity	8166	<u>.</u>	
This ide	39000	>	
	\$640	>	
Suitate			
Total Hardness	64500		
Total Suspended Solids	< \$9000		
OTHER			
T. A. I Oranio Carbon (110/1)	13300		
1 old organic caroon (Pers)			

NOTES:

µg/L = micrograms per liter <= less than

B = analyte found in method blank or QC blank as

well as the sample.

C * analysis was confirmed

D = duplicate F = filtered

I = low spike recovery is high

M = high spike recovery is high
N = high spike recovery is low
U = analysis is unconfirmed
V = sample was subjected to unusual
stonge/preservation conditions

HYDROGEOLOGIC DATA

- F-1 IN-SITU HYDRAULIC CONDUCTIVITY TESTING
- F-2 HYDRAULIC GRADIENT AND GROUNDWATER FLOW VELOCITY CALCULATIONS

IN-SITU HYDRAULIC CONDUCTIVITY TESTING

Harding Lawson Associates

APPENDIX F-1 HYDRAULIC CONDUCTIVITY TEST RESULTS

ABB-ES performed rising head slug tests on monitoring wells installed during the AOC 57 RI in November 1995 and January 1997. This appendix discusses the analytical procedure and presents estimated values of hydraulic conductivity. The test methodology is presented in Subsections 4.8.2 of Volume I of the Fort Devens POP (ABB-ES, 1995a). Field data from all tests were analyzed to estimate hydraulic conductivity using a derivation of the method of Hvorslev (1951)¹ and the method of Bouwer and Rice (1976)².

The form of the Hvorslev equation that was used relates the hydraulic conductivity, K, of an unconfined aquifer to the well geometry and the rate of head recovery by:

$$-K = \left[\frac{\text{Log}(H_1) - \text{Log}(H_2)}{t_1 - t_2}\right] \frac{r^2 \text{Log}(L / R)}{2L}$$

Parameters in this equation included: r (radius of the well casing), R (radius of the borehole), L (length of the aquifer tested), as well as time (t) and water level (H) data expressed as drawdown. Log values are log base ten. Test data were also analyzed using AQTESOLV^{TM3}, an aquifer test analysis program by Geraghty Miller, Inc. AQTESOLVTM utilizes the Bouwer and Rice method for estimating hydraulic conductivities in unconfined aquifers.

APPNDF.DOC 9144-03

¹Hvorslev, M.J., 1951. "Time Lag and Soil Permeability in Groundwater Observations;" U.S. Army Corps of Engineers, Waterways Experiment Station, Bulletin 36; Vicksburg, Mississippi.

²Bouwer, H. and R.C. Rice, 1976. A Slug Test Method for Determining Hydraulic Conductivity of Unconfined Aquifers with Completely or Partially Penetrating Wells, Water Resources Research, Vol. 12, No. 3, pp 423-428.

³AQTESOLV, 1991 "ATESOLV, Aquifer Test Solver Version 1.00;" Geraghty and Miller Modeling Group; Reston, VA.

Estimates of hydraulic conductivity for the 15 wells/piezometers tested at AOC 57 range between 1.22x10⁻¹ cm/sec and 4.22x10⁻⁴ cm/sec for the Bouwer and Rice method while the Hvorslev method yields values of 1.26x10⁻² cm/sec to 4.28x10⁻⁵ cm/sec. Typically the Bouwer and Rice method provided hydraulic conductivity values which were greater than the values obtained with the Hvorslev equation.

The results of hydraulic conductivity testing are summarized in Table F-1. The data for each test are also provided. The information contained in this Appendix is organized as follows:

- 1) Table F-1, Summary of In-Situ Hydraulic Conductivity Test Results; input parameters used for AQTESOLVTM analyses;
- 2) AQTESOLVTM plots with computed hydraulic conductivity values;
- 3) A table of calculation of hydraulic conductivities using the Hvorslev Equation; and
- 4) Raw data and plots of data for Hvorslev analyses;

Static water levels in each well were generally referenced to zero with head stress being expressed as a positive change.

APPNDF.DOC 9144-03

AQUIFER TEST NO. _____

	<u> </u>	T
SETUP	DATE	BY WHOM D MCCobe/R Lago
MONITORING WELL ID	57 M-95-01X	·
DATE OF TEST	11 (16 95	
TYPE OF TEST	Falling Head	Rising Head
HERMIT TYPE/SERIAL#	1000C 1K8 480	
TEST #	1	â
DATA COLLECTION RATE	ام	
TRANSDUCER		
SERIAL #	273872	•
PSIG	10	
SCALE FACTOR	10. 023	
OFFSET	-0.01	
INPUT CHANNEL	ĺ	
TEST DATA	·	
INPUT MODE (TOC/SUR)	Level	
STATIC WATER LEVEL (FT./TOC)	23.91	
WELL DEPTH (FT./TOC)	31.0	
XD DEPTH (FT.TOC)	29.8	
INITIAL XD REFERENCE	0.00	0.0
SLUG DEPTH (FT./TOC)		
TIME OF SLUG PLACEMENT	11:23	11:30
TIME OF WL EQUILIBRATION		·
NEW XD REFERENCE	0.00	0.00
START TIME OF TEST		
END TIME OF TEST		
NOTES:	3° by 3° long bar	stak Pvc slug

ABB Environmental Services, Inc.

AQUIFER TEST NO. __ SETUP BY WHOM DATE D.M. Cabe / R. Lago 57M-95-08X MONITORING WELL ID 1117/95 DATE OF TEST TYPE OF TEST Falling Head Risino Head HERMIT TYPE/SERIAL# 1000C KB 480 10000 6 KB 480 TEST # 19 DATA COLLECTION RATE iocil TRANSDUCER SERIAL # 272872 **PSIG** 10 SCALE FACTOR 10.023 **OFFSET** -0.01 INPUT CHANNEL **TEST DATA** INPUT MODE (TOC/SUR) Level STATIC WATER LEVEL (FT./TOC) 17.99 (PUC) WELL DEPTH (FT./TOC) 36.80 /pvc) XD DEPTH (FT.TOC) 25.0 INITIAL XD REFERENCE O.00 0.00 SLUG DEPTH (FT./TOC) TIME OF SLUG PLACEMENT TIME OF WL EQUILIBRATION 0.00 00.0 **NEW XD REFERENCE** START TIME OF TEST END TIME OF TEST NOTES:

210d 3. A ph 3. Porapay DAS

AQUIFER TEST NO. _____

SETUP	DATE	BY WHOM D MCCOby / B. Lago
MONITORING WELL ID	57M-95-03X	57m-95-03X
DATE OF TEST	11/16/95	
TYPE OF TEST	Falling Head	Rising Head
HERMIT TYPE/SERIAL#	1000C KB 480	
TEST #	3	4
DATA COLLECTION RATE	Log	
TRANSDUCER		
SERIAL#	272872	
PSIG	0	
SCALE FACTOR	10.023	
OFFSET	-0.01	
INPUT CHANNEL	1	
TEST DATA		
INPUT MODE (TOC/SUR)	Level	
STATIC WATER LEVEL (FT./TOC)	10.09	
WELL DEPTH (FT./TOC)	19.60	
XD DEPTH (FT.TOC)	19.0	
INITIAL XD REFERENCE	8.71	
SLUG DEPTH (FT./TOC)		
TIME OF SLUG PLACEMENT	13:27	13: 57
TIME OF WL EQUILIBRATION	13:48	14:10
NEW XD REFERENCE		
START TIME OF TEST		
END TIME OF TEST		
NOTES:	3'\$ by 3' bor stock	puc slog

---- ABB Environmental Services, Inc.-

AQUIFER TEST NO. _ SETUP DATE BY WHOM D.Mecah IR. Laco MONITORING WELL ID 57M-95-04A DATE OF TEST 11/17/95 Rising Head TYPE OF TEST Falling Head HERMIT TYPE/SERIAL# 10000 (C KB 480 TEST # 17 18 DATA COLLECTION RATE TRANSDUCER 2.728 72 SERIAL# **PSIG** tO SCALE FACTOR 10.023 OFFSET 10.0-INPUT CHANNEL **TEST DATA** Level INPUT MODE (TOC/SUR) STATIC WATER LEVEL (FT./TOC) 2.85 WELL DEPTH (FT./TOC) 13.0 XD DEPTH (FT.TOC) 12 INITIAL XD REFERENCE 8.63 SLUG DEPTH (FT./TOC) TIME OF SLUG PLACEMENT TIME OF WL EQUILIBRATION **NEW XD REFERENCE** 0.00 START TIME OF TEST END TIME OF TEST 3" \$ 6, 3' long NOTES: bar stock fue sloo

---- ABB Environmental Services, Inc.-

AQUIFER TEST NO. _ SETUP DATE BY WHOM D. McCaby / R. Lago MONITORING WELL ID 57M-95-04B DATE OF TEST 11/12/95 Rising Head TYPE OF TEST Falling Head HERMIT TYPE/SERIAL# 1000 C KR 480 TEST # 16 15 DATA COLLECTION RATE TRANSDUCER SERIAL # 272872 **PSIG** 10 SCALE FACTOR 0.023 OFFSET 10.0-INPUT CHANNEL TEST DATA INPUT MODE (TOC/SUR) Level STATIC WATER LEVEL (FT./TOC) 3.69 WELL DEPTH (FT./TOC) 31.0 XD DEPTH (FT.TOC) 1 20.0 INITIAL XD REFERENCE SLUG DEPTH (FT./TOC) TIME OF SLUG PLACEMENT TIME OF WL EQUILIBRATION NEW XD REFERENCE START TIME OF TEST END TIME OF TEST NOTES: 3" of by 3' long bar stock AVC Slug

ABB Environmental Services, Inc.-

		AQUIFER TEST NO
SETUP	DATE	BY WHOM D MCCOLLY R. Lago
MONITORING WELL ID	57M-95-05X	•
DATE OF TEST	11/16/95	
TYPE OF TEST	Falling Head	Rising Head
HERMIT TYPE/SERIAL#	1000 C KB 480	
TEST #	9	10
DATA COLLECTION RATE	Log	
TRANSDUCER		
SERIAL#	272872	
PSIG	10	
SCALE FACTOR	10.033	
OFFSET	-0.01	
INPUT CHANNEL	11	
TEST DATA		
INPUT MODE (TOC/SUR)	Level	
STATIC WATER LEVEL (FT./TOC)	15.11	
WELL DEPTH (FT./TOC)	22-2	
XD DEPTH (FT.TOC)	JO	
INITIAL XD REFERENCE	4.93	
SLUG DEPTH (FT./TOC)		
TIME OF SLUG PLACEMENT		
TIME OF WL EQUILIBRATION		
NEW XD REFERENCE		
START TIME OF TEST		
END TIME OF TEST		
NOTES:	3" \$ by 3' long bar	stock pue slug

AQUIFER TEST NO. _

SETUP	DATE	BY WHOM D.MCCabe/R.Lago
MONITORING WELL ID	57M-95-06X	
DATE OF TEST	11/16/95	
TYPE OF TEST	Falling Head	Rising Head
HERMIT TYPE/SERIAL#	1000C KB 480	
TEST #	5	6
DATA COLLECTION RATE	Loa	
TRANSDUCER		
SERIAL#	272872	
PSIG	10	
SCALE FACTOR	10 .OJ3	
OFFSET	-0.01	
INPUT CHANNEL	1	·
TEST DATA		
INPUT MODE (TOC/SUR)	Level	
STATIC WATER LEVEL (FT./TOC)	13.28	
WELL DEPTH (FT./TOC)	24.50	
XD DEPTH (FT.TOC)	20	
INITIAL XD REFERENCE	6.86	
SLUG DEPTH (FT./TOC)		
TIME OF SLUG PLACEMENT	14.35	
TIME OF WL EQUILIBRATION	14.38	
NEW XD REFERENCE		
START TIME OF TEST		
END TIME OF TEST		
NOTES:	Slug 3"\$ by 3' long	bar stock PUC

ABB Environmental Services, Inc.

AQUIFER TEST NO. _ SETUP BY WHOM DATE DiMcColor/R. Lago 57M-95-07X MONITORING WELL ID DATE OF TEST 11/16/95 Rising Head TYPE OF TEST Falting Head HERMIT TYPE/SERIAL# 1000 C KB 480 TEST # 8. 7 DATA COLLECTION RATE 1001 **TRANSDUCER** SERIAL # 272872 **PSIG** 10 10.023 SCALE FACTOR 10.0-OFFSET INPUT CHANNEL 1 **TEST DATA** INPUT MODE (TOC/SUR) Level STATIC WATER LEVEL (FT./TOC) 3.13 (pve) WELL DEPTH (FT./TOC) 14.50 XD DEPTH (FT.TOC) 12 INITIAL XD REFERENCE 8.81 SLUG DEPTH (FT./TOC) TIME OF SLUG PLACEMENT TIME OF WL EQUILIBRATION **NEW XD REFERENCE** START TIME OF TEST END TIME OF TEST NOTES:

3 m & by 3. long

ABB Environmental Services, Inc.-

bor-stock PUC Slog

AQUIFER TEST NO. _____

		AQUITER TEST NO.
SETUP	DATE	BY WHOM D. Macabe / R. Lago
MONITORING WELL ID	57M-95-08A	•
DATE OF TEST	11/17/95	
TYPE OF TEST	Falling Head	Rising Head
HERMIT TYPE/SERIAL#	1000 C KB 480	***
TEST #	13.	13
DATA COLLECTION RATE	Log	
TRANSDUCER		
SERIAL #	273872	
PSIG	10	
SCALE FACTOR	10,023	
OFFSET	-0.01	
INPUT CHANNEL		
TEST DATA	·	
INPUT MODE (TOC/SUR)	Level	
STATIC WATER LEVEL (FT./TOC)	2.78	
WELL DEPTH (FT./TOC)	14.1	
XD DEPTH (FT.TOC)	= 12	
INITIAL XD REFERENCE	9.65	
SLUG DEPTH (FT./TOC)		
TIME OF SLUG PLACEMENT		
TIME OF WL EQUILIBRATION		
NEW XD REFERENCE	0.0	
START TIME OF TEST		
END TIME OF TEST		
NOTES:	3"4 by 31 long bac	stack PVC slug

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AQUIFER TEST NO.

SETUP	DATE	BY WHOM D. MCCabe / R. Larp
MONITORING WELL ID	57M-95-08B	
DATE OF TEST	11/17/95	
TYPE OF TEST	Falling Head	Rising Head
HERMIT TYPE/SERIAL#	1000 C KB 480	
TEST #	1(12
DATA COLLECTION RATE	Log	
TRANSDUCER		
SERIAL #	2728 72	
PSIG	10	
SCALE FACTOR	10.03.3	
OFFSET	-0.01	
INPUT CHANNEL	1	·
TEST DATA		
INPUT MODE (TOC/SUR)	Level	
STATIC WATER LEVEL (FT./TOC)	3.56 (PUD)	
WELL DEPTH (FT./TOC)	30-A	
XD DEPTH (FT.TOC)	± 30	
INITIAL XD REFERENCE	16.28	
SLUG DEPTH (FT./TOC)		
TIME OF SLUG PLACEMENT		
TIME OF WL EQUILIBRATION		
NEW XD REFERENCE	0,0	
START TIME OF TEST		
END TIME OF TEST		
NOTES:	3" by 3' long bor	stock pur slug

AQUIFER TEST NO. 20-01

		AQUITER TEST NO.
SETUP	DATE	BY WHOM R. RUSTANS
MONITORING WELL ID	57m.96-09x	57m.96.09x
DATE OF TEST	1.16.96 97	1.16.97
TYPE OF TEST	RISING HEATS	1.16.97 REINE HEAD
HERMIT TYPE/SERIAL#	1000C / 1KB-480	
TEST #	00 - 01	
DATA COLLECTION RATE	106 01	
TRANSDUCER		
SERIAL #	6638	
PSIG	30 PSi	
SCALE FACTOR	29.6952	
OFFSET	-0.0162	
INPUT CHANNEL	#/	
TEST DATA		
INPUT MODE (TOC/SUR)	TOC	
STATIC WATER LEVEL (FT./TOC)	16.61	
WELL DEPTH (FT./TOC)	25.69	
XD DEPTH (FT.TOC)	₹0€ 25.1'	
INITIAL XD REFERENCE	0.0 (8.55)	
SLUG DEPTH (FT./TOC)	23.0	
TIME OF SLUG PLACEMENT	0930	
TIME OF WL EQUILIBRATION	0931	
NEW XD REFERENCE	(8.57)	
START TIME OF TEST	0933 / 0950	
END TIME OF TEST	0940 / 0954	
NOTES: TWO RISING HELD TEST		

AQUIFER TEST NO. 02-03

	T	
SETUP	DATE	ву wном
MONITORING WELL ID	57M.96.10X	P. Rusmais
DATE OF TEST	1.16.97	
TYPE OF TEST	RISING HEAD (2)	
HERMIT TYPE/SERIAL#	1000 C / 1KB-480	
TEST #	02 - 03	
DATA COLLECTION RATE	200 01	
TRANSDUCER		
SERIAL #	GG 38	
PSIG	30 PSI	
SCALE FACTOR	29.6952	
OFFSET	- 0.0162	
INPUT CHANNEL	# /	
TEST DATA		
INPUT MODE (TOC/SUR)	70 C	
STATIC WATER LEVEL (FT./TOC)	6.45' 15.56	
WELL DEPTH (FT./TOC)	15.56	
XD DEPTH (FT.TOC)	14	
INITIAL XD REFERENCE	0.0	
SLUG DEPTH (FT./TOC)	11'	
TIME OF SLUG PLACEMENT	1010	
TIME OF WL EQUILIBRATION	/030	
NEW XD REFERENCE	0.0 (REFERENCE)	
START TIME OF TEST	1033 (TI) / 1100 (TZ)	
END TIME OF TEST	1045(TU) // 10 (TZ)	
NOTES: 2 PISING HEAD T		

AQUIFER TEST NO. 03-04/ (AL) 04-03 **SETUP** DATE BY WHOM MONITORING WELL ID 57M.96.11X 1.16.97 DATE OF TEST TYPE OF TEST RISING HEATS HERMIT TYPE/SERIAL# 1000C/1KB480 TEST # **DATA COLLECTION RATE** LOG 01 TRANSDUCER 6638 SERIAL # **PSIG** 30 PST SCALE FACTOR 29.6952 OFFSET -0.0162 INPUT CHANNEL **TEST DATA** INPUT MODE (TOC/SUR) TOC 3.30' STATIC WATER LEVEL (FT./TOC) 14.59 WELL DEPTH (FT./TOC) XD DEPTH (FT.TOC) 13.00 INITIAL XD REFERENCE 0.0 8.0' SLUG DEPTH (FT./TOC) TIME OF SLUG PLACEMENT 1115 TIME OF WL EQUILIBRATION 1130 **NEW XD REFERENCE** 0.0 START TIME OF TEST //33 1200 END TIME OF TEST 1147 1212 NOTES:

2 RISING HEAD TESTS FERFORMES

AQUIFER TEST NO. 05-07

		AQUIFER TEST NO.
SETUP	DATE	ву wном
MONITORING WELL ID	57m. 94·12x	R. Russas
DATE OF TEST	1.16.97	
TYPE OF TEST	PISING HEATS	
HERMIT TYPE/SERIAL#	1000C / /KB-480	
TEST #	<i>∞</i> - 07	
DATA COLLECTION RATE	Loc 01	
TRANSDUCER		
SERIAL #	CLe 38	
PSIG	30 PSI	
SCALE FACTOR	29.6952	
OFFSET	-0.0162	
INPUT CHANNEL		
TEST DATA		
INPUT MODE (TOC/SUR)	TOC	
STATIC WATER LEVEL (FT./TOC)	4.39'	
WELL DEPTH (FT./TOC)	15.13'	
XD DEPTH (FT.TOC)	13'	
INITIAL XD REFERENCE	0.0	
SLUG DEPTH (FT./TOC)	10'	
TIME OF SLUG PLACEMENT	/220	
TIME OF WL EQUILIBRATION	/230	
NEW XD REFERENCE	0.0	
START TIME OF TEST	1231 / 1249	
END TIME OF TEST	1240 /1257	
NOTES: 2 RISING HELD	TESTS PERFORMEN	S

AQUIFER TEST NO. 08-09

	·	AQUIFER TEST NO. 33
SETUP	DATE	ву wном
MONITORING WELL ID	57M.96.13X	P. RUSTAD
DATE OF TEST	1.16.97	
TYPE OF TEST	RISING HEAD	
HERMIT TYPE/SERIAL#	1000 C / /KB-480	
TEST #	08-09	
DATA COLLECTION RATE	Loc 01	
TRANSDUCER		
SERIAL#	6638	
PSIG	30 PSI	
SCALE FACTOR	29.6952	
OFFSET	-0.0162	
INPUT CHANNEL	# /	
TEST DATA		
INPUT MODE (TOC/SUR)	TOC	
STATIC WATER LEVEL (FT./TOC)	4. 28'	
WELL DEPTH (FT./TOC)	14.89	
XD DEPTH (FT.TOC)	/3′	
INITIAL XD REFERENCE	0.0	
SLUG DEPTH (FT./TOC)	9'	
TIME OF SLUG PLACEMENT	1310	
TIME OF WL EQUILIBRATION	13/6	
NEW XD REFERENCE	0.0	
START TIME OF TEST	1320 / 1330	
END TIME OF TEST	1325 / 1335	
NOTES: 2 RISING HELD	TESTS PERFORME	N

TABLE F-1 SUMMARY OF HYDRAULIC CONDUCTIVITY TEST RESULTS AOC 57

REMEDIAL INVESTIGATION REPORT DEVENS, MASSACHUSETTS

									Bouwer	Bouwer and Rice	Hvorslev	slev	
	Well Diese	Concen Int	Filter Pack Int Satu	Saturated	Z,	Rw	Le	Hw	Hydraulic Cond.	Hydraulic Cond.	Hydraulic Cond. Hydraulic Cond. Hydraulic Cond. Hydraulic Cond.	Hydraulic Cond.	Screened
Well	well Diam. (in)	(feet, bgs)	(feet, bgs)	Height (feet)	(feet)	(feet)	(feet)	(feet)	(ft/min)	(cm/s)	(ft/min)	(cm/s)	Geology (USCS)
		78.											
210 30 3 123	•	10 00	13 to 29	7 09	0.29	0.46	7.09	7.09	2.40E-01	1.22E-01	2.49E-02	1.26E-02	SP.
57.10-55-M/5		3 5 5 5	50 ct o	88	0 29	0.46	9.81	9.81	1.80E-01	9.14E-02	1.61E-02	8.17E-03	SW-SM
X70-66-W/S	7 -	14 10 24	67 st 5	150	000	0.46	10.51	10.51	1.10E-02	5.59E-03	1.04E-03	5.27E-04	SW-SM
57M-95-05X	4 •	/10 1/	2 to 18	10.15	02.0	0.16	10.75	10.75	5.70E-02	2.90E-02	5.70E-03	2.90E-03	SP
57M-95-04A	4 •	2.4 to 12.4	13 13 20	10.13	0.10	0.46	17.	28.81	2.30E-02	1.17E-02	5.77E-03	2.93E-03	SS
57M-95-04B	4.	16.5 to 46.5	13 (0 30	00.6	0.10	0.15	7.00	7 09	1 00E-01	5.08E-02	1.01E-02	5.14E-03	SW-SM
57M-95-05X	4.	10 to 20	07 01 0		67.0	94.0	12.32	12.32	1 70E-02	8.64E-03	1.66E-03	8.42E-04	SP
57M-95-06X	4	11.9 to 21.9	8 to 23	77.11	0.29	5.0	12.32	12.32	COE-02	3 40E 02	7 OOE-03	3.56E-03	MS-WS
57M-95-07X	4	3 to 13	2 to 14	11.3/	0.29	0.40	12.37	12.37	0.707.0	20-201-0	20 100.0	20 100.7	SIN SIN
5711.95.0RA	4	3 to 13	2 to 15	11.32	0.29	0.46	13	13.32	8.30E-04	4.77E-04	8.425-05	4.205-05	TATC-AAC
G80 50 1423	. 4	18 to 28	13 to 30	26.64	0.17	0.46	17	28.64	7.40E-03	3.76E-03	2.02E-03	1.03E-03	SM
G07-C2-IVI/C		17840 238	x to 23	8 53	0.0	0.33	8.73	8.73	8.15E-03	4.14E-03	4.18E-04	2.13E-04	SP
5/M-90-09A	4 (2 40 13	2 0 0 7	60.0	20	0.33	9.03	9.03	1.36E-03	6.89E-04	4.39E-05	2.23E-05	SM
5/M-96-10X	4 (310 13	15 to 13	10.01		0.33	10.01	10.91	2.11E-03	1.07E-03	1.28E-04	6.53E-05	SM
5/M-90-11X	4 (21 01 2	1.5 10 12	10.51	; ;	0.33	10.66	10.66	2.60E-03	1.32E-03	1.20E-04	6.10E-05	SM
57M-96-12X	7	71 017	71 01 01 1	10.00	4 6	600	10.30	10.30	3 OKE-03	1 505.03	1 62E-04	8 24F-05	NS.
57M-96-13X	7	2 to 12	1.5 to 12	10.39	7.7	0.33	10.39	10.32	70770	20-700-1		1	
								Geom. Mean	1.34E-02	6.79E-03	1.18E-03	6.01E-04	
Notes:	1006	att are allers soire.	Notes:	f two rising head	tests			Average	4.80E-02	2.44E-02	5.02E-03	2.55E-03	
HACE SOURCE	CLASS TOT TAXA	Series wells decine	The second secon										

Notes:
Hydraulic conductivities for 1996-series wells are the average of results of two rising head tests.
Data analyzed using AQTESOLV (Bouwer & Rice Solution).

Re = Well casing radius for fully saturated filterpacks and equivalent casing radius which accounts for filterpack resaturation at n=30% for partially saturated filterpacks.

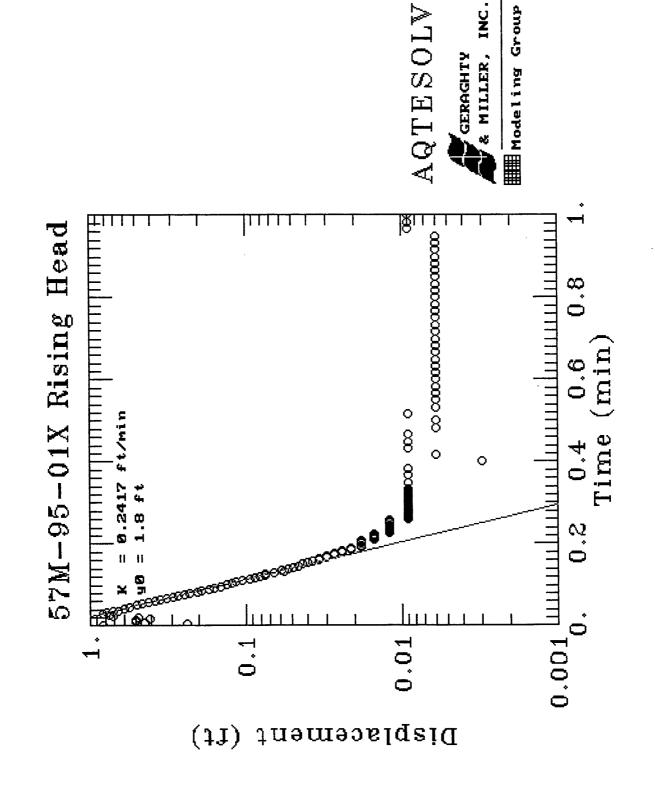
Rw = Radius of borehole.

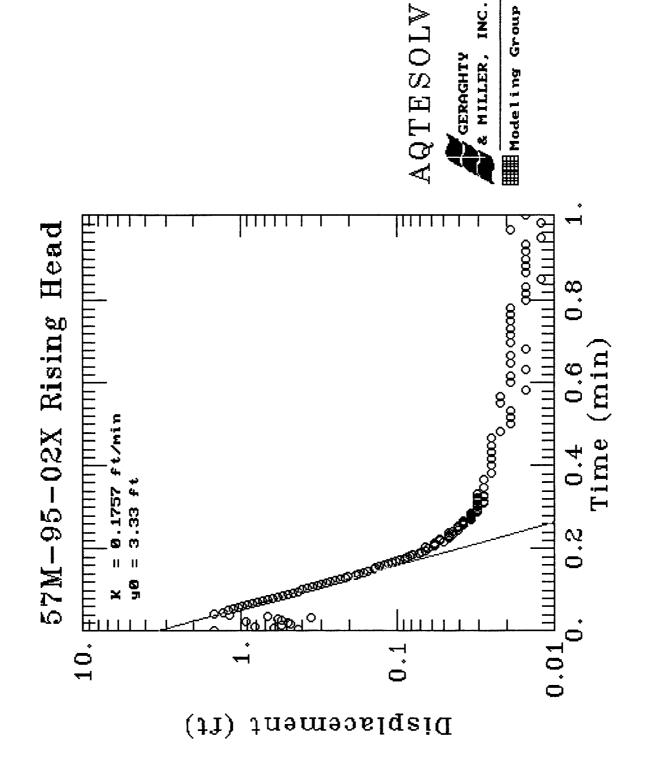
Le = Saturated length of filterpack.

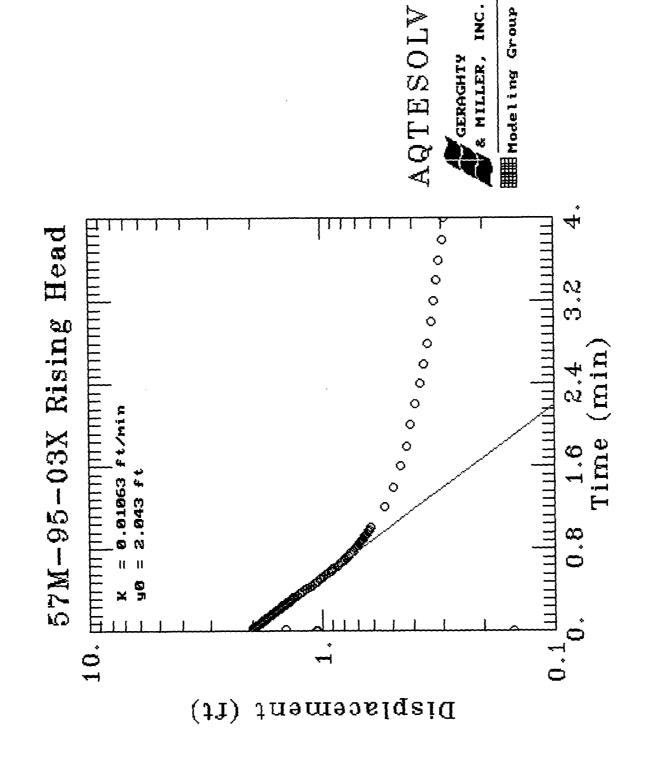
Hw = Faight of Water Column above filterpack bottom.

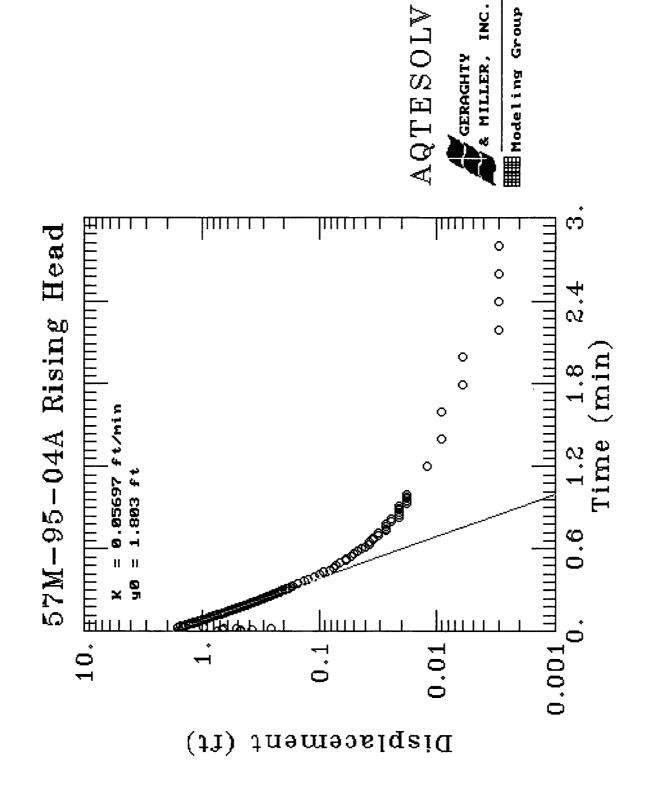
Saturated Height is height of water column measured in well.

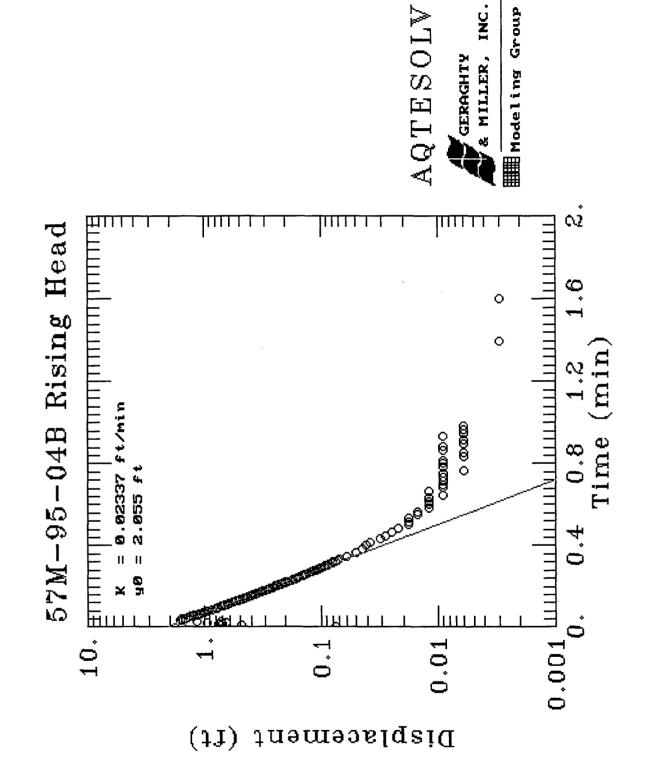
All measurements in feet unless otherwise noted.

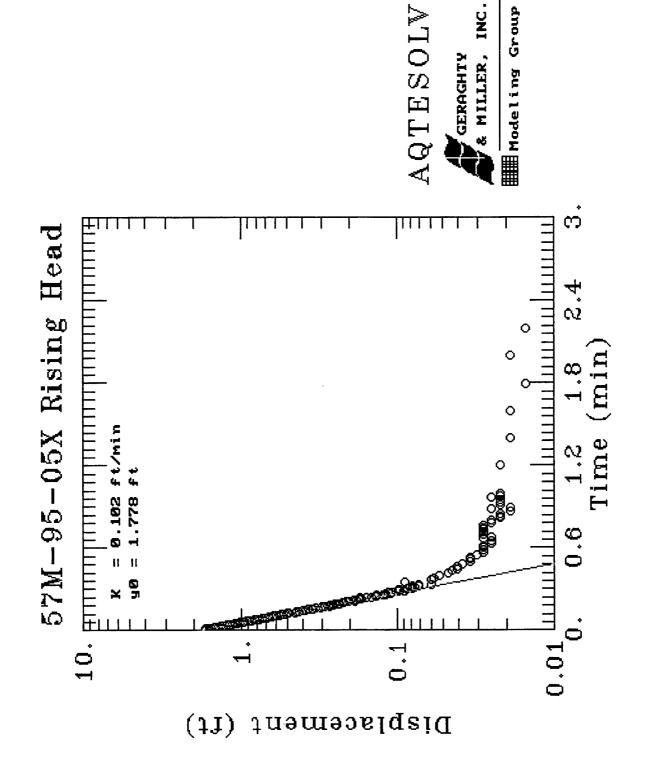


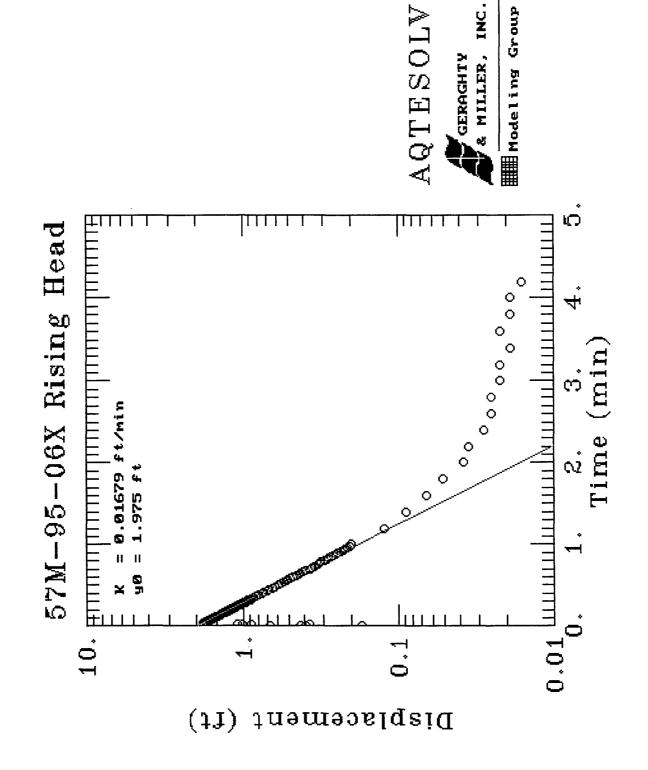


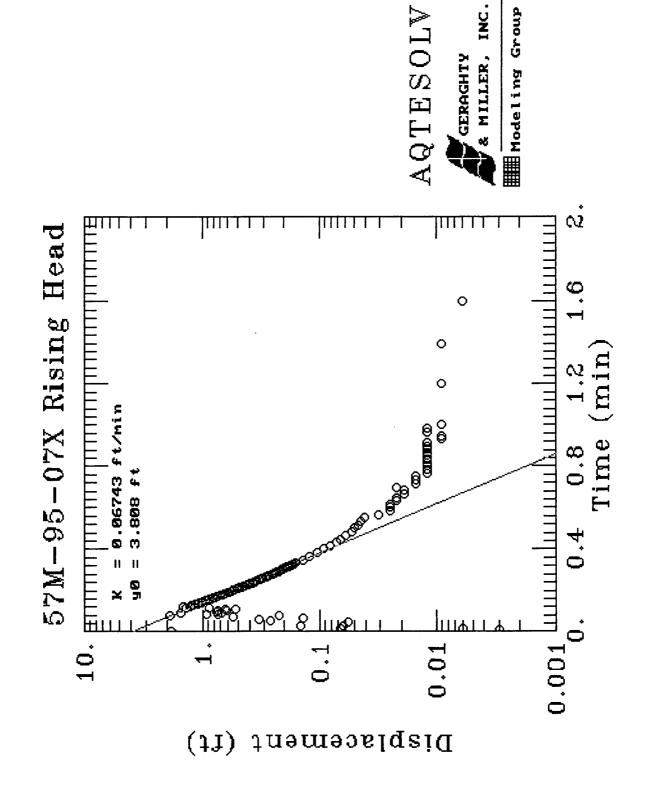


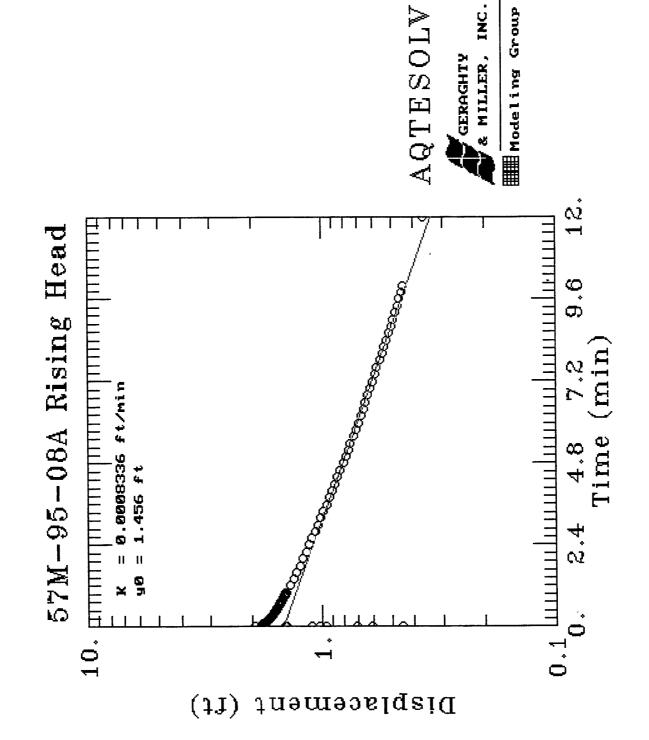


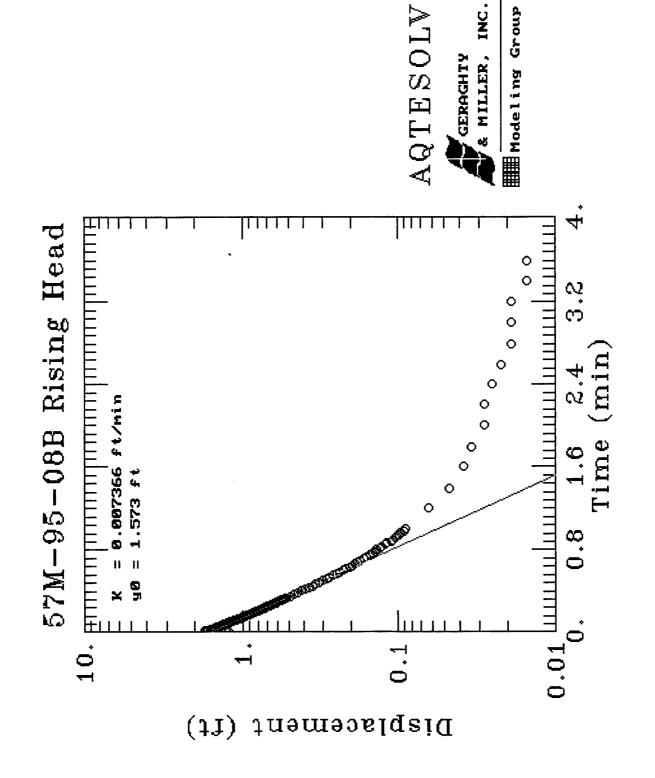


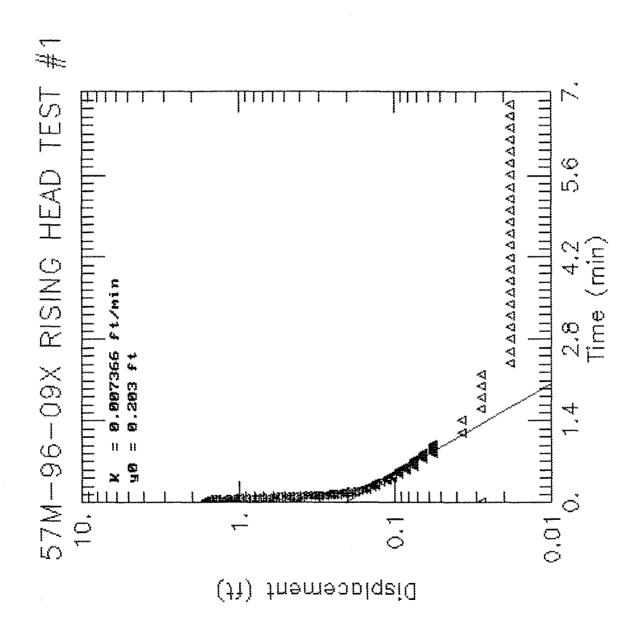


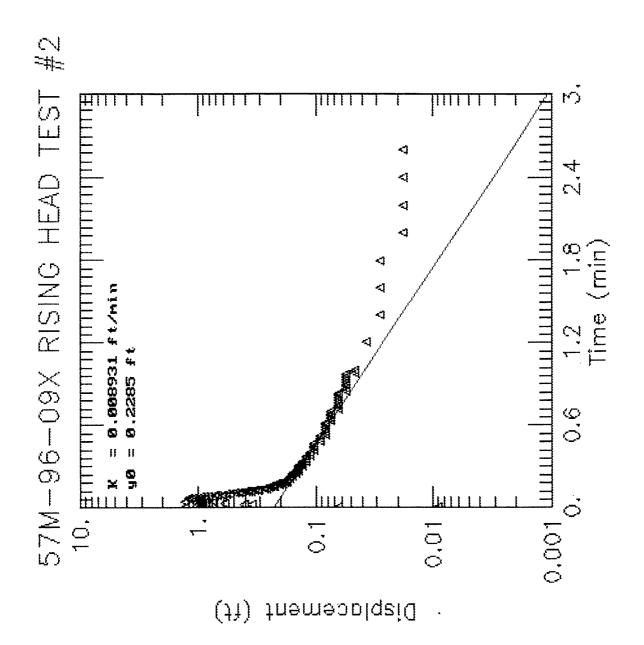


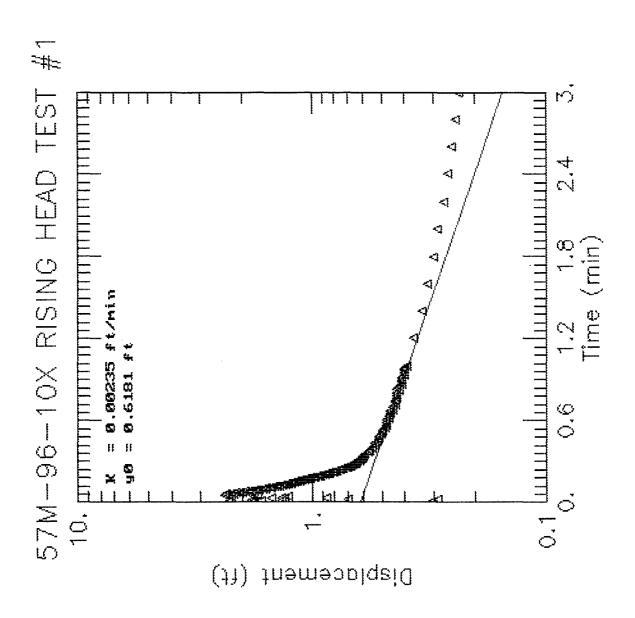


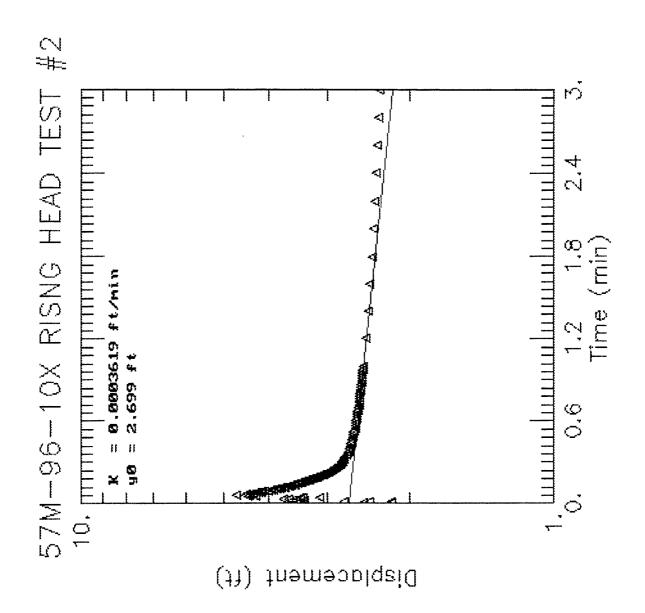


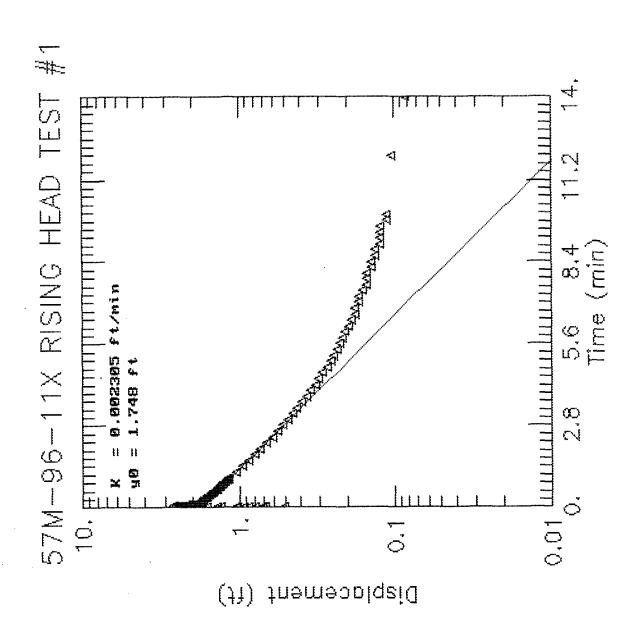


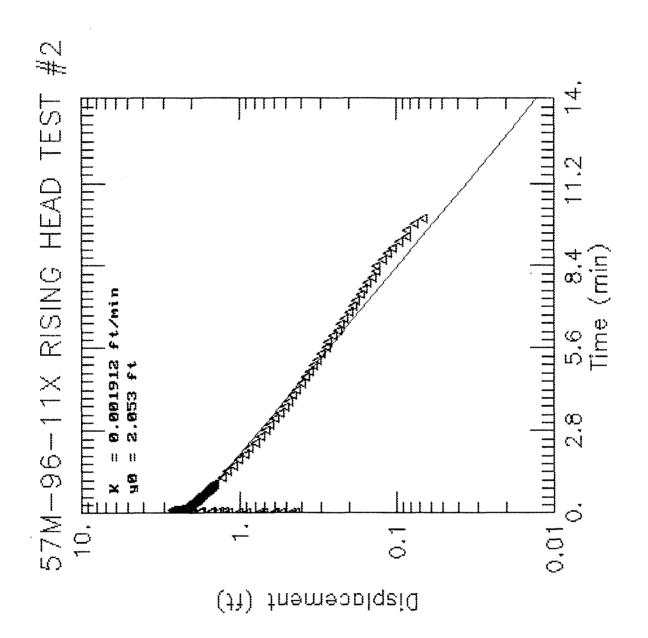


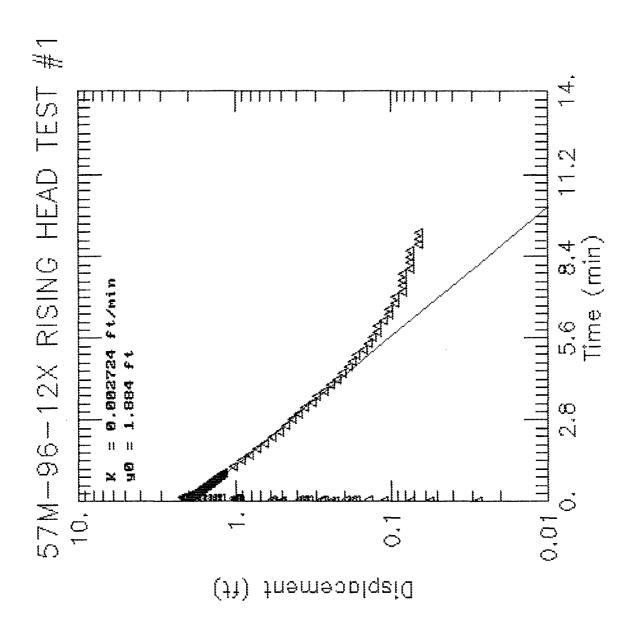


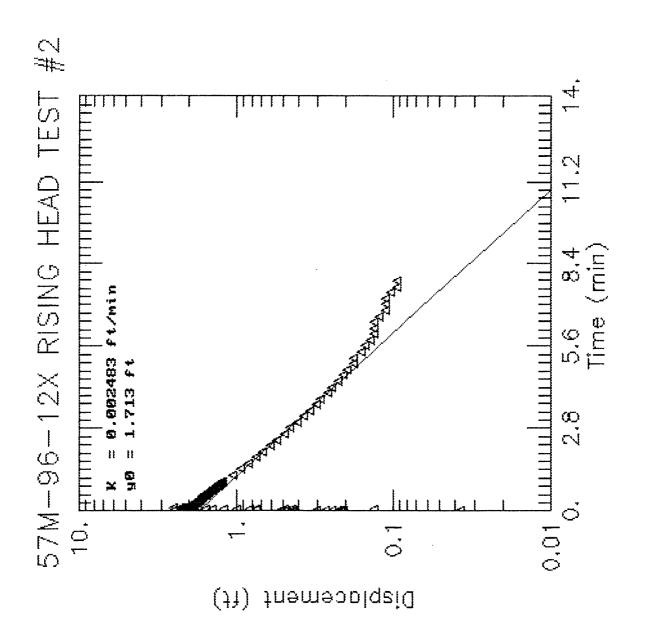


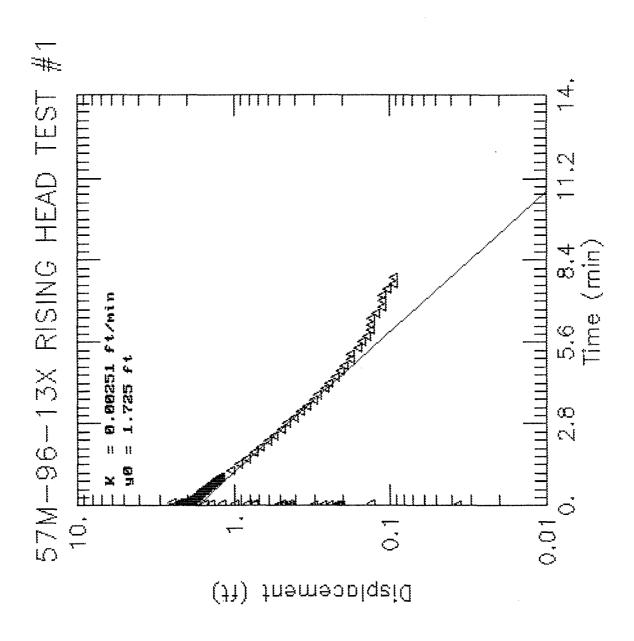


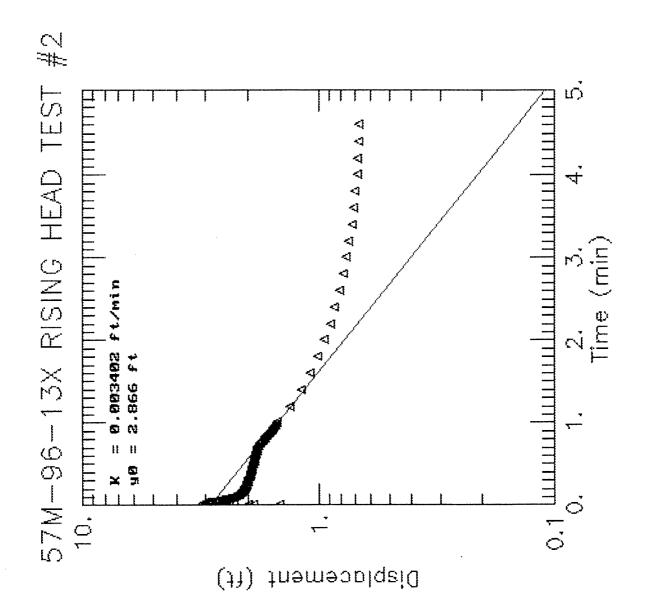












CALCULATION OF HYDRAULIC CONDUCTIVITIES USING THE HVORSLEV EQUATION AOC 57

K = -[(LOG Ht1 - LOG Ht2)/(t1 - t2)]{[(t) 2 LOG (L/R)]/2L}

WHERE:

t1 = TIME 1 (MINUTES)
t2 = TIME 2 (MINUTES)
Ht1 = HEAD STRESS AT TIME 1 (FEET)
Ht2 = HEAD STRESS AT TIME 2 (FEET)
r = RADIUS OF WELL CASING (FEET)
R = RADUS OF BOREHOLE (FEET)
L = EFFECTIVE SATURATED LENGTH OF SCREEN (FEET)

									 	VERAGE OF IV	AVERAGE OF MULTIPLE TESTS
WELL	=	12	Ħ	Ht2	_	œ	L TYPE	K (FT/MIN)	K (CM/SEC)	K (FT/MIN)	K (CM/SEC)
57M-95-01X	0.035	0.1	0.654	0.132	0.17	0.46	7.09 RISING	2.5E-02	1.3E-02		
57M-95-02X	0.05	0.2	1.207	0.063	0.17	0.46	9.81 RISING	1.6E-02	8.2E-03		
57M-95-03X	0.1	0.3	1.788	1.37	0.17	0.46	10.51 RISING	1.0E-03	5.3E-04		
57M-95-04A	0.08	0.3	1.05	0.205	0.17	0.46	10.75 RISING	5.7E-03	2.9E-03		
57M-95-04B	0.1	0.3	0.725	0.091	0.17	0.46	17 RISING	5.8E-03	2.9E-03		
57M-95-05X	0.1	0.3	0.63	0.085	0.17	0.46	7.09 RISING	1.0E-02	5.1E-03		
57M-95-06X	0.1	9.0	1.544	0.472	0.17	0.46	12.32 RISING	1.7E-03	8,4E-04		
57M-95-07X	0.15	0.3	0.956	0.212	0.17	0.46	12.37 RISING	7.0E-03	3.6E-03		
57M-95-08A	4.6	7.2	0.832	0.601	0.17	0.46	13 RISING	8.4E-05	4.3E-05		
57M-95-08B	0.1	0.4	1.193	0.418	0.17	0.46	17 RISING	2.0E-03	1,0E-03		
57M-96-09X1	0.4	0.8	0.112	0.065	0.08	0.33	8.7 RISING	3.35-04	1.7E-04		
57M-96-09X ²	0.3	0.5	0.14	0.093	0.08	0.33	8.7 RISING	5.0E-04	2.6E-04	4.2E-04	2.1E-04
57M-96-10X1	1.2	2	0.366	0.29	0.08	0.33	9.0 RISING	7.0E-05	3.5E-05		
57M-96-10X ²	9.0	1.4	2.562	2.449	0.08	0.33	9.0 RISING	1.8E-05	9.2E-06	4.4E-05	2.2E-05
57M-96-11X1	1.6	2.8	0.872	0.525	0.08	0.33	10.9 RISING	8.9E-05	4.5E-05		
57M-96-11X ²	2.8	4	0.366	0.14	0.08	0.33	10.9 RISING	1.7E-04	8,5E-05	1.3E-04	6.5E-05
57M-96-12X1	-	က	1.192	0.394	0.08	0.33	10.7 RISING	1.2E-04	6.0E-05		
57M-96-12X ²	0.8	2.4	1.379	0.553	0.08	0.33	10.7 RISING	1.2E-04	6,2E-05	1.2E-04	6.1E-05
57M-96-13X1	9.0	-	1.248	0.863	90'0	0.33	10.4 RISING	2.0E-04	1.0E-04		
57M-96-13X ²	0.8	1.6	1.717	1.088	0.08	0.33	10.4 RISING	1.2E-04	6.3E-05	1.6E-04	8.2E-05

NOTES:

, (4)

Rising Head Test #1
 Rising Head Test #2

57M-95-01X RH

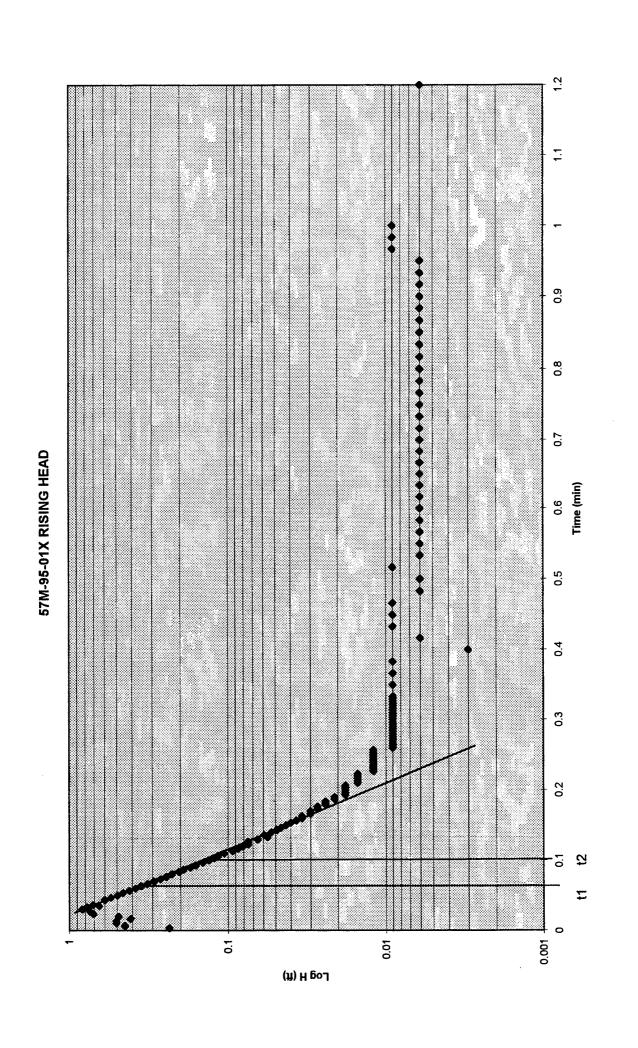
Time (min)	delta H (ft.)				T	
0	0.515					
0.0033			·			
		Wel	I ID: 57M-	95-01X		
0.0066	0.445		t Date: 11/			
0.01	0.505	4 *	t Type: Ris			
0.0133	0.505		l Diameter	_		-
0.0166	0.41			er: 0.833 ft.		
0.02	0.489		-	rval (bgs): 1		
0.0233				Height: 7.0		
0.0266	0.746		Ci Ooluiiii	r roigitt. 7.0	75 16.	
0.03	0.832					
0.0333	0.778					
0.0366	0.714					
0.035	0.654					
0.0433	0.6					
0.0466	0.55					
0.05	0.499					
0.0533	0.458					
0.0566	0.417					
0.06	0.382					
0.0633	0.353					
0.0666	0.322					
0.07	0.293					
0.0733	0.268					
0.0766	0.246					
0.08	0.227			 		
0.0833	0.205					
0.0866	0.192					
0.09	0.173			 		
0.0933	0.16					
0.0966	0.144					
0.1						
0.1033	0.122					
0.1066	0.122					
0.1000	0.106					
0.1133						
0.1166	0.097			-	 	
0.110		-				
0.1233						
0.1233						
0.1200						
0.1333						
0.1333						
0.1366						
0.1433						
				ļ		
0.1466						
0.15	0.043				<u> </u>	
0.1533				<u> </u>	<u> </u>	
0.1566	0.037					
0.16					ļ <u>.</u>	
0.1633	0.034			<u> </u>		<u> </u>

57M-95-01X RH

Time (min)	delta H (ft.)				
0.1666	0.03				
0.17	0.03				
0.1733	0.027		 		
0.1766	0.027				
0.18	0.024				
0.1833	0.024				
0.1866	0.021				
0.19	0.021				
0.1933	0.018				
0.1966	0.018		 		
0.2	0.018				
0.2033	0.018				
0.2066	0.018				
0.21	0.015		 		
0.2133	0.015				
0.2166	0.015				
0.22	0.015				
0.2233	0.015		 		-
0.2266	0.012		 		
0.23	0.012		 		
0.2333	0.012	· · · · · · · · · · · · · · · · · · ·			
0.2366	0.012				
0.24	0.012				
0.2433	0.012				
0.2466	0.012				
0.25	0.012		 		
0.2533	0.012		 		
0.2566	0.012				
0.26	0.009				
0.2633	0.009				
0.2666	0.009				
0.27	0.009				
0.2733	0.009				
0.2766	0.009				
0.28	0.009				
0.2833	0.009				
0.2866	0.009				
0.29	0.009				
0.2933	0.009	-			
0.2966	0.009				
0.3	0.009				
0.3033	0.009		 		
0.3066	0.009				
0.31	0.009				
0.3133	0.009				
0.3166	0.009				
0.32	0.009			•	
0.3233	0.009				
0.3266	0.009				
0.33	0.009				

57M-95-01X RH

Time (min)	delta H (ft.)		<u> </u>	
0.3333	0.009			
0.35	0.009			
0.3666	0.009	 		
0.3833	0.009			
0.4	0.003			
0.4166	0.006			
0.4333	0.009			
0.45	0.009			
0.4666	0.009			
0.4833	0.006			
0.5	0.006			
0.5166	0.009	 		
0.5333	0.006			
0.55	0.006			
0.5666	0.006			
0.5833	0.006			
0.6	0.006			
0.6166	0.006			
0.6333	0.006			
0.65	0.006			
0.6666	0.006			
0.6833	0.006			
0.7	0.006			
0.7166	0.006			
0.7333	0.006			
0.75	0.006			
0.7666	0.006			
0.7833	0.006			
0.8	0.006			
0.8166	0.006			
0.8333	0.006			
0.85	0.006			
0.8666	0.006			
0.8833	0.006			
0.9				
0.9166				
0.9333				
0.95				
0.9666				
0.9833				
1	0.009			
1.2	0.006			



57M-95-02X RH

Time (min)	delta H (ft.)				1	
0	0.259					
0.0033		Well	ID: 57M-95	-02X		
0.0033		Test I	Date: 11/17/	/95		
0.0000		Test	Type: Rising	Head		<u> </u>
<u> </u>	0.814	•	Diameter: 0	-		
0.0133	0.545	Borin	g Diameter:	0.833 ft.		
0.0166	0.478		ened Interva		24 ft.	
0.02	0.494	1	r Column H			
0.0233				J		
0.0266						
0.03						
0.0333						
0.0366	0.668					
0.04	1.182					
0.0433	1.473					
0.0466	1.302					
0.05	1.207					
0.0533	1.118					
0.0566	1					
0.06	0.969					
0.0633	0.9					
0.0666						
0.07	0.779					ļ
0.0733	0.722					
0.0766	0.665				<u> </u>	
0.08	0.621					
0.0833	0.576				-	
0.0866	0.535					
0.09	0.497					
0.0933						
0.0966						
0.1			İ			
0.1033						
0.1066						
0.11	f	.,				
0.1133						
0.1166 0.12						
0.1233			-			
0.1266				l	<u> </u>	
0.13	1					
0.1333					1	
0.1366						
0.14					ļ	
0.1433					ļ	
0.1466	I					
0.15						
0.1533					ļ	
0.1566						
0.16						
0.1633	0.114					

57M-95-02X RH

Time (min)	delta H (ft.)		-			
0.1666	0.107					
0.17	0.101					
0.1733	0.095					
0.1766	0.088					
0.1700	0.085					
0.1833	0.082					
0.1866	0.079					
0.1000	0.079					
0.1933	0.072			7		
0.1933	0.066					
0.1900	0.063					
0.2033	0.065					
<u> </u>	0.057					
0.2066						
0.21	0.057					
0.2133	0.057					
0.2166	0.05					
0.22	0.053					
0.2233	0.053					
0.2266	0.047					
0.23	0.047					
0.2333	0.047					
0.2366	0.044					
0.24	0.047					
0.2433	0.044					***
0.2466	0.041					
0.25	0.041					
0.2533	0.041					
0.2566	0.038				.,	
0.26	0.038					
0.2633	0.038					
0.2666	0.038					
0.27	0.034					
0.2733	0.034					
0.2766	0.034					
0.28	0.034					
0.2833	0.034					
0.2866	0.034					
0.29	0.031					
0.2933	0.031					
0.2966	0.031					
0.3	0.031					
0.3033	0.031					
0.3066	0.031					
0.31	0.028					
0.3133	0.028					
0.3166	0.031					
0.32	0.031					
0.3233	0.031					
0.3266	0.028					
0.33	0.028	· · · · · · · · · · · · · · · · · · ·				
0.00	0.020		L	L	Ļ	

57M-95-02X RH

0.3333	ime (min)	delta H (ft.)				
0.35 0.028 0.3666 0.028 0.3833 0.025 0.44 0.025 0.4166 0.025 0.4333 0.025 0.4666 0.025 0.4833 0.022 0.5 0.019 0.5166 0.019 0.5333 0.019 0.5566 0.022 0.5833 0.015 0.6 0.019 0.6166 0.019 0.6333 0.015 0.65 0.019 0.6666 0.019 0.6833 0.015 0.65 0.019 0.6833 0.015 0.7 0.019 0.7166 0.019 0.7333 0.019 0.75 0.019 0.75 0.019 0.7666 0.019 0.7833 0.019 0.8666 0.019 0.85 0.012 0.8666 0.015			 			
0.3666 0.028 0.3833 0.025 0.4 0.025 0.4166 0.4333 0.025 0.45 0.025 0.45 0.025 0.4666 0.025 0.4833 0.022 0.5 0.019 0.5166 0.019 0.5333 0.055 0.022 0.5666 0.022 0.5833 0.015 0.6 0.019 0.6166 0.619 0.6333 0.65 0.019 0.6333 0.015 0.65 0.019 0.6666 0.019 0.7066 0.019 0.7166 0.019 0.7333 0.015 0.75 0.019 0.7833 0.019 0.7833 0.019 0.7833 0.019 0.8066 0.019 0.8166 0.015 0.8333 0.015 0.85 0.012 0.8666 0.015 0.99 0.015 <td></td> <th></th> <td></td> <td></td> <td></td> <td></td>						
0.3833 0.025 0.4 0.025 0.4166 0.025 0.4333 0.025 0.45 0.025 0.4666 0.025 0.4833 0.022 0.5 0.019 0.5166 0.019 0.5333 0.019 0.55 0.022 0.5833 0.015 0.6 0.019 0.6166 0.019 0.6333 0.015 0.65 0.019 0.6666 0.019 0.6833 0.015 0.7 0.019 0.7166 0.019 0.7333 0.019 0.75 0.019 0.7660 0.019 0.7833 0.019 0.8066 0.015 0.8166 0.015 0.8333 0.015 0.8066 0.015 0.8333 0.015 0.8666 0.015 0.9015 0.012 <						
0.4 0.025 0.4166 0.025 0.4333 0.025 0.4666 0.025 0.4833 0.022 0.5 0.019 0.5166 0.019 0.5333 0.019 0.555 0.022 0.5666 0.022 0.5833 0.015 0.6 0.019 0.6166 0.019 0.6333 0.015 0.655 0.019 0.6666 0.019 0.6833 0.015 0.6833 0.015 0.7 0.019 0.7166 0.019 0.7333 0.019 0.75 0.019 0.7666 0.019 0.7833 0.019 0.8066 0.015 0.8166 0.015 0.8833 0.015 0.8833 0.015 0.90666 0.015 0.995 0.012 0.9666 0.019			 			
0.4166 0.025 0.4333 0.025 0.466 0.025 0.4833 0.022 0.5 0.019 0.5166 0.019 0.5333 0.019 0.5666 0.022 0.5833 0.015 0.6 0.019 0.6166 0.019 0.6333 0.015 0.65 0.019 0.6666 0.019 0.6833 0.015 0.7 0.019 0.7166 0.019 0.7333 0.019 0.75 0.019 0.7666 0.019 0.7833 0.019 0.7833 0.019 0.8066 0.015 0.8333 0.015 0.85 0.012 0.8666 0.015 0.99 0.015 0.9966 0.015 0.9966 0.019 0.9966 0.019 0.9833 0.012			 			
0.4333 0.025 0.4666 0.025 0.4833 0.022 0.5 0.019 0.5166 0.019 0.5333 0.019 0.555 0.022 0.5833 0.015 0.6 0.019 0.6166 0.019 0.6333 0.015 0.65 0.019 0.6666 0.019 0.6833 0.015 0.7 0.019 0.7666 0.019 0.7333 0.019 0.75 0.019 0.7666 0.019 0.7833 0.019 0.7833 0.019 0.8166 0.015 0.8333 0.015 0.8466 0.015 0.85 0.012 0.8666 0.015 0.99 0.015 0.99 0.015 0.9966 0.019 0.995 0.012 0.9666 0.019 <t< th=""><th></th><th></th><th></th><th></th><th></th><th></th></t<>						
0.45 0.025 0.4666 0.025 0.4833 0.022 0.5 0.019 0.5166 0.019 0.5333 0.019 0.55 0.022 0.5666 0.022 0.5833 0.015 0.6 0.019 0.6166 0.019 0.6333 0.015 0.65 0.019 0.6666 0.019 0.6833 0.015 0.7 0.019 0.7333 0.019 0.75 0.019 0.7666 0.019 0.7833 0.019 0.7833 0.019 0.8066 0.015 0.8166 0.015 0.8333 0.015 0.85 0.012 0.8666 0.015 0.9166 0.015 0.9333 0.015 0.9966 0.019 0.9666 0.019 0.99666 0.019						
0.4666 0.025 0.4833 0.022 0.5 0.019 0.5166 0.019 0.5333 0.019 0.55 0.022 0.5666 0.022 0.5833 0.015 0.6 0.019 0.6166 0.019 0.6333 0.015 0.65 0.019 0.6666 0.019 0.70 0.019 0.7166 0.019 0.75 0.019 0.7666 0.019 0.7666 0.019 0.75 0.019 0.7833 0.019 0.8 0.015 0.8166 0.015 0.8333 0.015 0.85 0.012 0.8666 0.015 0.9166 0.015 0.9333 0.015 0.995 0.012 0.9666 0.019 0.9883 0.012						
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0.5 0.019 0.5166 0.019 0.5333 0.019 0.55 0.022 0.5666 0.022 0.5833 0.015 0.6 0.019 0.6166 0.019 0.6333 0.015 0.65 0.019 0.6833 0.015 0.7 0.019 0.7466 0.019 0.75 0.019 0.7666 0.019 0.7833 0.019 0.7833 0.019 0.8 0.015 0.8166 0.8166 0.015 0.85 0.012 0.8666 0.015 0.9166 0.015 0.9333 0.015 0.95 0.012 0.9666 0.019 0.9833 0.012 0.9666 0.019 0.9833 0.012						
0.5166 0.019 0.5333 0.019 0.55 0.022 0.5666 0.022 0.5833 0.015 0.6 0.019 0.6166 0.019 0.6333 0.015 0.65 0.019 0.6866 0.019 0.7166 0.019 0.7333 0.019 0.75 0.019 0.7666 0.019 0.7833 0.019 0.8 0.015 0.8166 0.015 0.8233 0.015 0.85 0.012 0.8833 0.015 0.9 0.015 0.9166 0.015 0.9333 0.015 0.95 0.012 0.9666 0.019 0.9833 0.012						
0.5333 0.019 0.55 0.022 0.5666 0.022 0.5833 0.015 0.6 0.019 0.6166 0.019 0.6333 0.015 0.65 0.019 0.6833 0.015 0.7 0.019 0.7166 0.019 0.75 0.019 0.7833 0.019 0.7833 0.019 0.8 0.015 0.8166 0.015 0.8333 0.015 0.85 0.012 0.8666 0.015 0.9 0.015 0.9166 0.015 0.92 0.015 0.9333 0.015 0.95 0.012 0.9833 0.012						
0.55 0.022 0.5833 0.015 0.6 0.019 0.6166 0.019 0.6333 0.015 0.65 0.019 0.6666 0.019 0.7 0.019 0.7166 0.019 0.75 0.019 0.7666 0.019 0.7833 0.019 0.7833 0.019 0.8066 0.015 0.8166 0.015 0.8333 0.015 0.85 0.012 0.8666 0.015 0.9166 0.015 0.9333 0.015 0.95 0.012 0.9666 0.019 0.9833 0.012						
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0.6 0.019 0.6166 0.019 0.6333 0.015 0.65 0.019 0.6666 0.019 0.6833 0.015 0.7 0.019 0.7166 0.019 0.7333 0.019 0.75 0.019 0.7666 0.019 0.7833 0.019 0.8 0.015 0.8166 0.015 0.8533 0.012 0.8666 0.015 0.9 0.015 0.9166 0.015 0.9333 0.015 0.95 0.012 0.9833 0.012	- 1	1				
0.6166 0.019 0.6333 0.015 0.65 0.019 0.6666 0.019 0.6833 0.015 0.7 0.019 0.7166 0.019 0.7333 0.019 0.7666 0.019 0.7833 0.019 0.8 0.015 0.8166 0.015 0.85 0.012 0.8666 0.015 0.9 0.015 0.9166 0.015 0.9333 0.015 0.95 0.012 0.9833 0.012						
0.6333 0.015 0.65 0.019 0.6666 0.019 0.6833 0.015 0.7 0.019 0.7166 0.019 0.75 0.019 0.7666 0.019 0.7833 0.019 0.8 0.015 0.8166 0.015 0.85 0.012 0.8666 0.015 0.9 0.015 0.9166 0.015 0.9333 0.015 0.95 0.012 0.9666 0.019 0.9833 0.012	0.6					
0.655 0.019 0.6666 0.019 0.6833 0.015 0.7 0.019 0.7166 0.019 0.7333 0.019 0.7666 0.019 0.7833 0.019 0.8 0.015 0.8166 0.015 0.85 0.012 0.8666 0.015 0.8833 0.015 0.99 0.015 0.9166 0.015 0.9333 0.015 0.95 0.012 0.9666 0.019 0.9833 0.012	0.6166					
0.6666 0.019 0.6833 0.015 0.7 0.019 0.7166 0.019 0.7333 0.019 0.7666 0.019 0.7833 0.019 0.8 0.015 0.8166 0.015 0.85 0.012 0.8666 0.015 0.8833 0.015 0.9 0.015 0.9166 0.015 0.9333 0.015 0.95 0.012 0.9666 0.019 0.9833 0.012	0.6333					
0.6833 0.015 0.7 0.019 0.7166 0.019 0.7333 0.019 0.75 0.019 0.7666 0.019 0.8 0.015 0.8166 0.015 0.8333 0.015 0.85 0.012 0.8833 0.015 0.9 0.015 0.9166 0.015 0.9333 0.015 0.95 0.012 0.9666 0.019 0.9833 0.012	0.65	0.019				
0.7 0.019 0.7166 0.019 0.7333 0.019 0.75 0.019 0.7666 0.019 0.8 0.015 0.8166 0.015 0.85 0.012 0.8666 0.015 0.9 0.015 0.9166 0.015 0.9333 0.015 0.95 0.012 0.9833 0.012	0.6666	0.019				
0.7166 0.019 0.7333 0.019 0.75 0.019 0.7666 0.019 0.8 0.015 0.8166 0.015 0.85 0.012 0.8666 0.015 0.9 0.015 0.9166 0.015 0.9333 0.015 0.95 0.012 0.9666 0.019 0.9833 0.012	0.6833	0.015				
0.7333 0.019 0.75 0.019 0.7666 0.019 0.7833 0.019 0.8 0.015 0.8166 0.015 0.8333 0.015 0.8666 0.015 0.8833 0.015 0.9 0.015 0.9166 0.015 0.9333 0.015 0.95 0.012 0.9666 0.019 0.9833 0.012	0.7	0.019				
0.75 0.019 0.7666 0.019 0.7833 0.019 0.8 0.015 0.8166 0.015 0.8333 0.015 0.85 0.012 0.8666 0.015 0.9 0.015 0.9166 0.015 0.9333 0.015 0.95 0.012 0.9666 0.019 0.9833 0.012	0.7166	0.019				
0.7666 0.019 0.7833 0.019 0.8 0.015 0.8166 0.015 0.8333 0.015 0.8666 0.015 0.8833 0.015 0.9 0.015 0.9166 0.015 0.9333 0.015 0.95 0.012 0.9833 0.012	0.7333	0.019		,		
0.7833 0.019 0.8 0.015 0.8166 0.015 0.8333 0.015 0.8666 0.015 0.8833 0.015 0.9 0.015 0.9166 0.015 0.9333 0.015 0.95 0.012 0.9833 0.012	0.75	0.019				
0.8 0.015 0.8166 0.015 0.8333 0.015 0.85 0.012 0.8666 0.015 0.9 0.015 0.9166 0.015 0.9333 0.015 0.95 0.012 0.9833 0.012	0.7666	0.019				
0.8166 0.015 0.8333 0.015 0.85 0.012 0.8666 0.015 0.8833 0.015 0.9 0.015 0.9166 0.015 0.9333 0.015 0.95 0.012 0.9833 0.012	0.7833	0.019				
0.8333 0.015 0.85 0.012 0.8666 0.015 0.8833 0.015 0.9 0.015 0.9166 0.015 0.9333 0.015 0.95 0.012 0.9666 0.019 0.9833 0.012		0.015				
0.85 0.012 0.8666 0.015 0.8833 0.015 0.9 0.015 0.9166 0.015 0.9333 0.015 0.95 0.012 0.9666 0.019 0.9833 0.012	0.8166	0.015				
0.8666 0.015 0.8833 0.015 0.9 0.015 0.9166 0.015 0.9333 0.015 0.95 0.012 0.9666 0.019 0.9833 0.012	0.8333	0.015				
0.8833 0.015 0.9 0.015 0.9166 0.015 0.9333 0.015 0.95 0.012 0.9666 0.019 0.9833 0.012	0.85	0.012				
0.9 0.015 0.9166 0.015 0.9333 0.015 0.95 0.012 0.9666 0.019 0.9833 0.012	0.8666	0.015				
0.9166 0.015 0.9333 0.015 0.95 0.012 0.9666 0.019 0.9833 0.012	0.8833	0.015				
0.9166 0.015 0.9333 0.015 0.95 0.012 0.9666 0.019 0.9833 0.012	0.9	0.015				
0.95 0.012 0.9666 0.019 0.9833 0.012	0.9166					
0.9666 0.019 0.9833 0.012	0.9333	0.015				
0.9666 0.019 0.9833 0.012	0.95	0.012				
	0.9666	0.019				
	0.9833	0.012				
1 0.015	1	0.015				
1.2 0.012	1.2					
1.4 0.022						
1.6 0.019						
1.8 0.015					-	
2 0.015						
2.2 0.019						
2.4 0.019						

57M-95-03X RH

Time (min)	delta H (ft.)			[
Ó	0.809	, <u>, , , , , , , , , , , , , , , , , , </u>				<u> </u>
0.0033	1.05		D: 57M-95			
0.0066	0.151		ate: 11/16/			
0.000	1.066	1	ype: Rising			
0.0133	1.443	—∣Well □	Diameter: 0.	333 ft.		
0.0133	1.959	Boring	Diameter:	0.833 ft.		
		Scree	ned Interva	l (bgs): 7-17	7 ft.	
0.0233	1.99	Water	Column He	eight: 9.51 f	t.	
0.0266	1.987					
0.03	1.971					
0.0333	1.959					
0.0366	1.949					
0.04	1.94					
0.0433	1.937					
0.0466	1.921					
0.05	1.924					
0.0533	1.902					
0.0566	1.892					
0.06	1.899					
0.0633	1.876					
0.0666	1.87					
0.07	1.864					
0.0733	1.857					
0.0766	1.848					
0.08	1.838					
0.0833	1.829					
0.0866	1.823					
0.09	1.813					
0.0933	1.807					
0.0966	1.797					
0.1	1.788					
0.1033	1.769					
0.1066						
0.11	1.762					
0.1133	1.762					
0.1166						
0.12						
0.1233						h
0.1266						
0.13			 		-	
0.1333						
0.1366			 			
0.14			 		 	
0.1433			 	 		
0.1466			ļ	 		
0.1400						
0.1533			 	 		
0.1566				 		<u> </u>
0.1300			 	ļ <u>.</u>	<u> </u>	
0.1633			<u> </u>			
0.1633			<u> </u>			
0.1000	1.030					

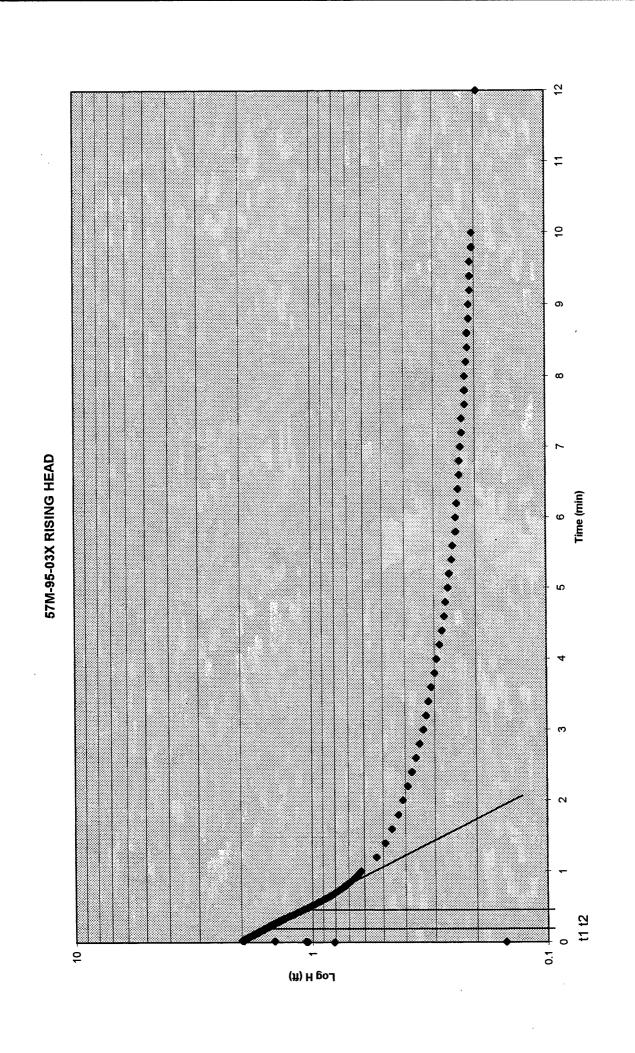
Time (min)	delta H (ft.)			<u> </u>	<u> </u>
0.17	1.629		 		
£			 		
0.1733	1.62				
0.1766	1.598		 		
0.18	1.607		 		
0.1833	1.604		 		
0.1866	1.601				
0.19	1.588				
0.1933	1.582				
0.1966	1.576				
0.2	1.566				
0.2033	1.553				
0.2066	1.553				
0.21	1.55				
0.2133	1.528				
0.2166	1.534				
0.22	1.525				
0.2233	1.506				
0.2266	1.515				
0.23	1.506		 		
0.2333	1.503				
0.2366	1.493				
0.24	1.481		 		
0.2433	1.49		 ·		
0.2466	1.471		 		
0.25	1.465				
0.2533	1.471		 		
0.2566	1.449				
0.26	1.443				
0.2633	1.439				
0.2666	1.433		 		
0.27	1.427				
0.2733	1.424				
0.2766	1.417				
0.28	1.408		 		
0.2833	1.401		 		
0.2866	1.389		 		
0.29	1.389		 		
0.2933	1.382		 		
0.2966	1.373				
0.3	1.37				
0.3033	1.36				
0.3066	1.357				
0.31	1.354				
0.3133	1.344				
0.3166	1.341		 	7.4	
0.3100	1.335				
0.3233	1.325				
0.3266	1.323				
0.3200	1.322				
0.3333	1.310		 		
0.3333	1.31			<u> </u>	1

57M-95-03X RH

Time (min)	delta H (ft.)				
0.35	1.278				
0.3666	1.246				
	1.246				
0.3833					
0.4	1.183				
0.4166	1.161				
0.4333	1.129				
0.45	1.104				
0.4666	1.075				
0.4833	1.047				
0.5	1.025				
0.5166	1.002	-			
0.5333	0.977				
0.55	0.958				
0.5666	0.939				
0.5833	0.914				
0.6	0.898				
0.6166	0.879				
0.6333	0.86				
0.65	0.841				
0.6666	0.822				
0.6833	0.809				
0.7	0.797				
0.7166	0.781				
0.7333	0.768				
0.75	0.755				
0.7666	0.743				
0.7833	0.73				
8.0	0.717				
0.8166	0.711	_			
0.8333	0.698				
0.85	0.689				
0.8666	0.679				
0.8833	0.67				
0.9	0.664				
0.9166					
0.9333					
0.95					
0.9666				,	
0.9833					
1	0.619				
1.2					
1.4					
1.6	0.458				
1.8					
2					
2.2	0.391				
2.4					
2.6					
2.8					
3					
		L	L		

57M-95-03X RH

Time (min)	delta H (ft.)				
3.2	0.325				
3.4	0.318			-	
3.6	0.309				
3.8	0.299				
4	0.293				
4.2	0.284				
4.4	0.277				
4.6	0.271				
4.8	0.268				
5	0.261				
5.2	0.258				
5.4	0.252				
5.6	0.249				
5.8	0.242				
6	0.242				
6.2	0.239				
6.4	0.236				
6.6	0.233	 			
6.8	0.233				
7	0.23				
7.2	0.227				
7.4	0.227				
7.6	0.22	 			
7.8	0.22				
8					
8.2		 			
8.4	0.214	ļ			
8.6	0.214	 			
8.8	0.211				
9					
9.2					
9.4	0.208				
9.6					
9.8					
10			-		
12	0.195		L	<u> </u>	



57M-95-04A RH

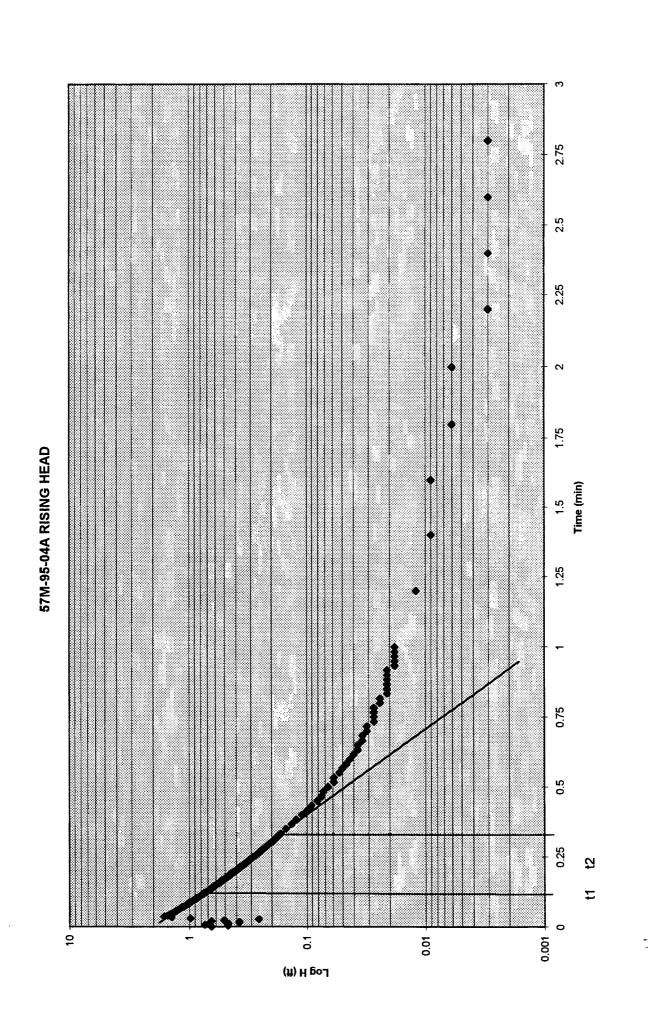
Time (min)	delta H (ft.)		1		T T	
0	0.654					
0.0033	0.474		<u>ID: 57M-95</u>			
0.0066	0.743	1	Date: 11/17/			
0.01	0.471		Type: Rising			
0.0133	0.677		Diameter: 0			
0.0166	0.379	Borin	g Diameter:	0.833 ft.		
0.02	0.654	Scree	ened Interva	ıl (bgs): 2.4-	·12.4 ft.	
0.0233		Wate	r Column H	eight: 10.15	ift.	
0.0266	0.259					
0.0203	0.984					
0.0333	1.414					
0.0366	1.633		-			
0.000	1.525					
0.0433	1.471					
0.0466	1.424		 			
0.0400	1.38		 		 	
0.0533	1.338		 			
0.0566	1.294		<u> </u>		<u> </u>	
0.0306	1.254			 	 	
0.0633	1.212					
0.0666	1.186					
0.000	1.148				 	
0.0733	1.114					
0.0766	1.082					
0.08	1.05		1			
0.0833	1.022		1			
0.0866	0.993					
0.09	0.965					
0.0933					1	
0.0966	0.914					
0.1						
0.1033						
0.1066						
0.11	0.819					
0.1133						
0.1166						
0.12						
0.1233	0.734					
0.1266						
0.13						
0.1333						
0.1366						
0.14	0.642					
0.1433	0.629					
0.1466						
0.15						
0.1533	0.582					
0.1566						
0.16	0.55					
0.1633	0.537					

57M-95-04A RH

Time (min)	delta H (ft.)					
0.1666	0.525					
0.17	0.509					
0.1733	0.496					
0.1766	0.483					
0.18	0.474					
0.1833	0.461					-
0.1866	0.449					
0.19	0.439					
0.1933	0.426					
0.1966	0.417					
0.2	0.407					
0.2033	0.395					
0.2066	0.389					
0.21	0.379	· · · · · · · · · · · · · · · · · · ·				
0.2133	0.369					
0.2166	0.36					
0.22	0.35					
0.2233	0.344					
0.2266	0.335					
0.23	0.328	····				
0.2333	0.322					
0.2366	0.322					
0.2300	0.306					
0.2433	0.303					
0.2466	0.293					
0.2400	0.287					
0.2533	0.278					
0.2566	0.271					
0.26	0.265			····		
0.2633	0.259					
0.2666	0.255					
0.27	0.249					
0.2733	0.243					
0.2766	0.24					
0.28	0.233					
0.2833	0.227					
0.2866	0.224					
0.29	0.217					
0.2933	0.214					
0.2966	0.211			· · · · · · · · · · · · · · · · · · ·		
0.3	0.205					
0.3033	0.198					
0.3066	0.195					
0.31	0.192					
0.3133	0.186					
0.3166	0.183					
0.32	0.179					
0.3233	0.176					
0.3266	0.176					
0.33	0.17					
0.00	0.17		L		L	L

57M-95-04A RH

Time (min)	delta H (ft.)			<u> </u>	
0.3333	0.167	 			
0.35	0.151				
0.3666	0.135	 			
0.3833	0.123	 			
0.4	0.11				
0.4166	0.1				
0.4333	0.091				
0.45	0.081				
0.4666	0.075			7	
0.4833	0.072				
0.5	0.066				
0.5166	0.059				
0.5333	0.059				
0.55	0.053				
0.5666	0.05	 			
0.5833	0.046	 			
0.6	0.043				
0.6166	0.04				
0.6333	0.037				
0.65	0.037	 			
0.6666	0.034				
0.6833	0.034				
0.0033	0.034				
0.7166	0.031	 			
0.7333	0.031				
0.75	0.027				
0.7666	0.027				
0.7833	0.027				
0.7833	0.027				
0.3166	0.024				
0.8333	0.024				
0.85	0.021				
		 		· · · · · · · · · · · · · · · · · · ·	
0.8666	0.021				
0.8833	0.021				
0.9	0.021				
0.9166	0.021				
0.9333	0.018	 			
0.95	0.018	 			
0.9666	0.018				
0.9833	0.018			!	
1	0.018	 			
1.2					
1.4					
1.6					
1.8					
2					
2.2					
2.4					
2.6	0.003				
2.8	0.003				



57M-95-04B RH

Time (min)	delta H (ft.)				l	1		
0.0033								
		Well	ID: 57M-95	-04B				
0.0066	0.487	Test	— Test Date: 11/17/95					
0.01	0.731	Test Type: Rising Head						
0.0133	0.766	Well	Well Diameter: 0.333 ft.					
0.0166	0.706	Borin	Boring Diameter: 0.833 ft.					
0.02	0.962	— Scree	Screened Interval (bgs): 18.5-28.5 ft.					
0.0233	0.661	Wate						
0.0266	0.725							
0.03	1.184							
0.0333								
0.0366	1.633							
0.04	1.573							
0.0433	1.475							
0.0466	1.396							
0.05	1.326							
0.0533	1.269							
0.0566	1.216							
0.06	1.168							
0.0633								
0.0666	1.076							
0.07	1.035							
0.0733	0.997							
0.0766	0.956							
0.08	0.924							
0.0833	0.874							
0.0866								
0.09	0.81							
0.0933	0.785							
0.0966	0.753							
0.1								
0.1033				., .,				
0.1066								
0.11 0.1133	0.639							
	0.62							
0.1166 0.12	0.601 0.573		1					
0.12								
0.1233								
0.1266								
0.1333								
0.1333								
0.1300								
0.1433								
0.1466								
0.1400								
0.1533								
0.1533								
0.1566								
0.1633								
0.1633								
U.1000	0.348				1			

Time (min)	delta H (ft.)				
0.17	0.335				
0.1733	0.323				
0.1766	0.313				
0.18	0.297				
0.1833	0.288		 		
0.1866	0.275				
0.100	0.269				
0.1933	0.259				
0.1966	0.25				
0.1900	0.243				
0.2033	0.243				
0.2066	0.228				
0.21	0.218				
0.2133	0.212	,			
0.2166	0.202				
0.22	0.199				
0.2233	0.19				
0.2266	0.177				
0.23	0.177				
0.2333	0.171				
0.2366	0.164				
0.24	0.161				
0.2433	0.155				
0.2466	0.152				
0.25	0.145				
0.2533	0.142				
0.2566	0.139				
0.26	0.133				
0.2633	0.126	, , , , , , ,			
0.2666	0.126				
0.27	0.12		.,		
0.2733	0.117				
0.2766	0.114		 .,		
0.28	0.11				
0.2833	0.107				
0.2866	0.104				
0.29	0.101		 		
0.2933	0.098		 	<u> </u>	
0.2966	0.095		 		
0.3	0.091		 		
0.3033	0.088				
0.3066					
0.300	0.085		 		
0.3133	0.079		 		
0.3166	0.079				
0.3100	0.079		 		
0.3233	0.079				
0.3233	0.076				
0.33	0.072				
0.3333	0.069		<u> </u>	<u> </u>	

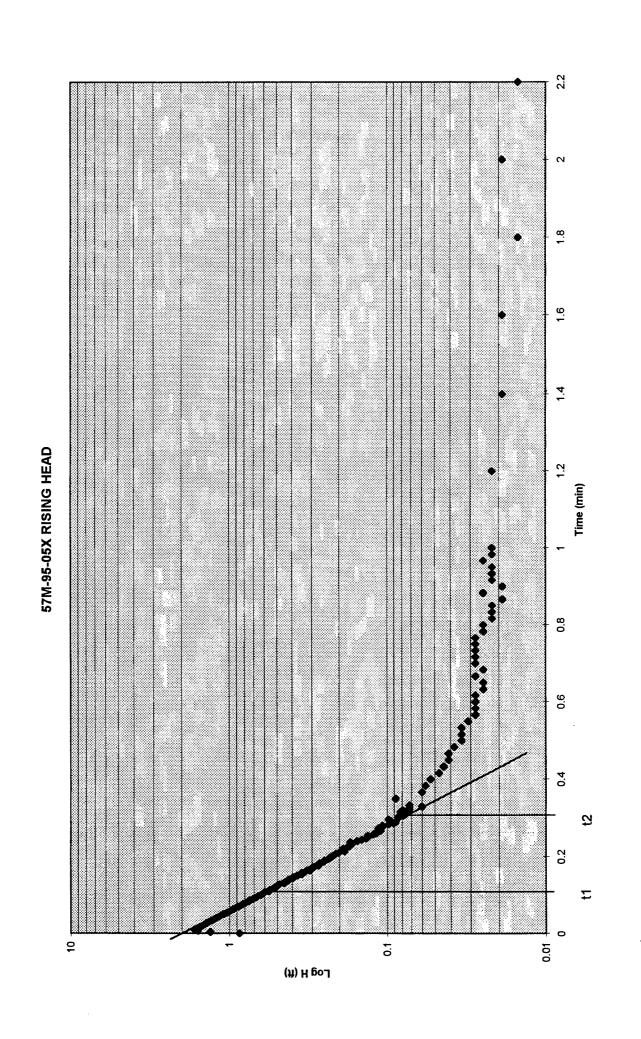
57M-95-04B RH

Time (min)	delta H (ft.)				
0.35	0.06	 	****		
0.3666	0.05	 			
0.3833	0.044	 			
0.4	0.041				
0.4166	0.038				
0.4333	0.031	 			
0.45	0.028				
0.4666	0.025				
0.4833	0.022	 			
0.5	0.018	 			
0.5166	0.018	 ·			
0.5333	0.018	 			
0.55	0.015				
0.5666	0.015				
0.5833	0.013	 			
0.5055	0.012				
0.6166	0.012				
0.6333	0.012				
0.65	0.012	 			
0.6666	0.009				
0.6833	0.012	 			
0.7	0.009				
0.7166	0.009				
0.7333	0.009				
0.75	0.009				
0.7666	0.006				
0.7833	0.009				
0.8	0.009	 			
0.8166	0.009	 			
0.8333	0.006	 			
0.85	0.006	 			
0.8666	0.009				
0.8833	0.009				
0.9	0.006				
0.9166		 			
0.9333			<u> </u>		
0.95		 		`	
0.9666					
0.9833		 			
1.4		 			
1.6	0.003				

Time (min)	delta H (ft.)							
0	0.867	144 44	D =======	051/				
0.0033	1.323		D: 57M-95					
0.0066	1.583		Test Date: 11/16/95					
0.01	1.675	,	Test Type: Rising Head					
0.0133	1.583	Į.	Well Diameter: 0.333 ft.					
0.0166	1.535	1	g Diameter:					
0.02	1.485		Screened Interval (bgs): 10-20 ft.					
0.0233	1.437	Wate	r Column He	eight: 7.09	ft.			
0.0266	1.393				T			
0.03	1.348							
0.0333	1.295							
0.0366	1.253							
0.04	1.215							
0.0433	1.168							
0.0466	1.139							
0.05	1.089	<u> </u>						
0.0533	1.048	······································						
0.0566	1.013							
0.06	0.981							
0.0633	0.949							
0.0666	0.915							
0.07	0.88							
0.0733	0.851							
0.0766	0.823							
0.08	0.791							
0.0833	0.76	-						
0.0866	0.741							
0.09	0.712							
0.0933								
0.0966								
0.1	0.63							
0.1033	0.617							
0.1066	<u> </u>							
0.11								
0.1133								
0.1166								
0.12								
0.1233								
0.1266								
0.13								
0.1333								
0.1366								
0.14								
0.1433								
0.1466								
0.15								
0.1533	1				ļ			
0.1566								
0.16								
0.1633	0.31	· · · · · · · · · · · · · · · · · · ·	1	L.,				

Time (min)	dolta LI (ff)	-	 		i
0.1666			 		
	0.31		 		
0.17	0.3				
0.1733	0.291				
0.1766	0.272				
0.18	0.272		 		
0.1833	0.266				
0.1866	0.253				
0.19	0.25				
0.1933	0.237				
0.1966	0.231				
0.2	0.224				
0.2033	0.218		 		
0.2066	0.212				
0.21	0.202				
0.2133	0.186				
0.2166	0.19				
0.22	0.19				
0.2233	0.18				
0.2266	0.174		 		
0.23	0.171				
0.2333	0.167		 	,	
0.2366	0.171		 		
0.24	0.155				
0.2433	0.145				
0.2466	0.136		 		
0.25	0.133		 		
0.2533	0.133				
0.2566	0.123		 		
0.26	0.117				
0.2633	0.117				
0.2666	0.11				
0.27	0.11		 		
0.2733	0.114		 		
0.2766	0.107				
0.28	0.107		 		
0.2833	0.098				
0.2866	0.091		 		
0.29	0.088				
0.2933	0.095				
0.2966	0.098				
0.3	0.085		 		
0.3033	0.085		 		
0.3066	0.079				
0.31	0.076		 		
0.3133	0.079		 		
0.3166	0.082		 		
0.32	0.079		 <u> </u>		
0.3233	0.072				
0.3266	0.072		 <u></u>		
0.3200	0.072		 		
0.33	0.00		 		

Time (min)	delta H (ft.)			
0.3333	0.072			
0.35	0.088		,	
0.3666	0.06			
0.3833	0.057			
0.4	0.053	:		
0.4166	0.047			
0.4333	0.044			
0.45	0.044			
0.4666	0.041			
0.4833	0.041			
0.4633	0.034	 		
0.5166				
1	0.034			
0.5333	0.034			
0.55	0.031			
0.5666	0.028			
0.5833	0.028			
0.6	0.028			
0.6166	0.028	 		
0.6333	0.025			
0.65	0.025	<u> </u>		
0.6666	0.028			
0.6833	0.025			
0.7	0.028	 		
0.7166	0.028	 		
0.7333	0.028			
0.75				
0.7666		 		
0.7833	0.025	 		
0.8				
0.8166	0.022			
0.8333	0.022	 		
0.85	0.022			
0.8666	0.019			
0.8833	0.025			
0.9		-		
0.9166				
0.9333		 		
0.95				
0.9666		 		
0.9833	0.022			
1	0.022			
1.2		 		
1.4				
1.6	1			
1.8				
2				
2.2	0.015			



Time (min)	delta H (ft.)	····							
0	0.13					<u> </u>			
0.0033			D: <u>57M-95</u> -						
0.0066			Date: 11/16/						
0.01			Test Type: Rising Head						
0.0133	0.393	1 -	Well Diameter: 0.333 ft.						
0.0166			Boring Diameter: 0.833 ft.						
0.02			Screened Interval (bgs): 11.9-21.9 ft.						
0.0233		Water	Column He	eight: 11.22	ft.				
0.0266			1						
0.03									
0.0333	l								
0.0366									
0.04									
0.0433	1								
0.0466									
0.0400									
0.0533				-					
0.0566									
0.0300	I								
0.0633									
0.0666									
0.000						-			
0.0733									
0.0766									
0.0708									
0.0833									
0.0866									
0.00									
0.0933									
0.0966									
0.1									
0.1033									
0.1066									
0.10									
0.1133									
0.1166									
0.12					-				
0.1233									
0.1266									
0.13									
0.1333				-					
0.1366									
0.14			1						
0.1433									
0.1466									
0.15					†				
0.1533					 				
0.1566									
0.16						 			
0.1633									
3.1000	1.022		1						

Time (min)	delta H (#)			T	
0.1666	delta H (ft.)		 		
0.1666	1.313 1.304				
0.1733	1.291				
0.1766	1.278				
0.18	1.266		 		
0.1833	1.256				
0.1866	1.253				
0.19	1.243		 		
0.1933	1.227		 		
0.1966	1.218				
0.2	1.209				
0.2033	1.205		 		
0.2066	1.19		 		
0.21	1.183		 		
0.2133	1.17				
0.2166	1.164				
0.22	1.155				
0.2233	1.145				
0.2266	1.139				
0.23	1.114				,
0.2333	1.123				
0.2366	1.107				
0.24	1.107				
0.2433	1.091				
0.2466	1.088				
0.25	1.076	,	 		
0.2533	1.069				
0.2566	1.06				,
0.26	1.053		 		
0.2633	1.041				
0.2666	1.041				
0.27	1.025				
0.2733	1.019		 		
0.2766	1.012				
0.28	1.006				
0.2833	0.994				
0.2866	0.991		 		
0.29	0.988				
0.2933	0.978				
0.2966	0.966				
0.3	0.956				
0.3033	0.95				
0.3066	0.947				
0.31	0.94				
0.3133	0.943	- 			<u> </u>
0.3166	0.921				
0.3100	0.915				
0.3233	0.909	.,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,			
0.3266	0.896				
0.3200	0.893				
0.33	0.093		 	l	

Time (min)				i	
0.3333	0.89		 		
0.35	0.852				
0.3666	0.832				
0.3833	0.823				
0.4	0.754				
0.4166	0.731				
0.4333	0.697				
0.45	0.678				
0.4666	0.646		 		
0.4833	0.624				
0.5	0.589				
0.5166	0.564		 		
0.5333	0.548		 		
0.55	0.526				
0.5666	0.51				
0.5833	0.494		 		
0.6	0.472		 		
0.6166	0.453				
0.6333	0.434	<u>.</u>			
0.65	0.424		 		
0.6666	0.408		 		
0.6833	0.393				
0.7	0.367				
0.7166	0.358		 		
0.7333	0.348				
0.75	0.326				
0.7666	0.323		 		
0.7833	0.313		 		
0.8	0.298				
0.8166	0.288				
0.8333	0.279				
0.85	0.272				
0.8666	0.26				
0.8833	0.25				
0.9	0.247				
0.9166	0.234				
0.9333	0.225				
0.95	0.218				
0.9666	0.212				
0.9833	0.203				
1	0.199				
1.2	0.123				
1.4	0.089				
1.6	0.066				
1.8	0.051				
2	0.038				
2.2	0.035				
2.4	0.028				
2.6	0.025				
2.8	0.025				

Time (min)	delta H (ft.)			
3	0.022			
3.2	0.022			
3.4	0.019			
3.6	0.022			
3.8	0.019			
4	0.019			
4.2	0.016			

Time (min)	delta H (ft.)					
0.0066						<u></u>
0.01			D: 57M-95-			
0.0133		1	ate: 11/16/			
0.0166			ype: Rising			
0.0266	0.063	1	Diameter: 0.			ļ — — — — — — — — — — — — — — — — — — —
0.03		, -	Diameter:			
0.0466	0.057		ned Interval			
0.0533		–∣Water	Column He	eight: 11.37	ft.	
0.0566		-[,			
0.0666						
0.0733						
0.0766	1.868					
0.08						
0.0833	0.927					<u> </u>
0.0833	0.737					
0.0888			-			
0.0933						
0.0933	0.756					
0.0900	0.744					
0.1033	0.627					
0.1066	0.525					
0.1000						
0.1133	1.402					
0.1166						
0.110						
0.1233						
0.1266	1.272					
0.12	1.215					
0.1333	1.165					
0.1366	1.117					
0.14	1.073					
0.1433						
0.1466	0.994					
0.15						
0.1533	0.918					
0.1566	0.886					
0.16	0.851					
0.1633	0.82					
0.1666	0.791					
0.17	0.76					
0.1733	0.734					
0.1766	0.706					
0.18	0.68					
0.1833	0.658					
0.1866	0.633					
0.19	0.611					
0.1933	0.592					
0.1966	0.57					
0.2	0.551					
0.2033	0.531					
						

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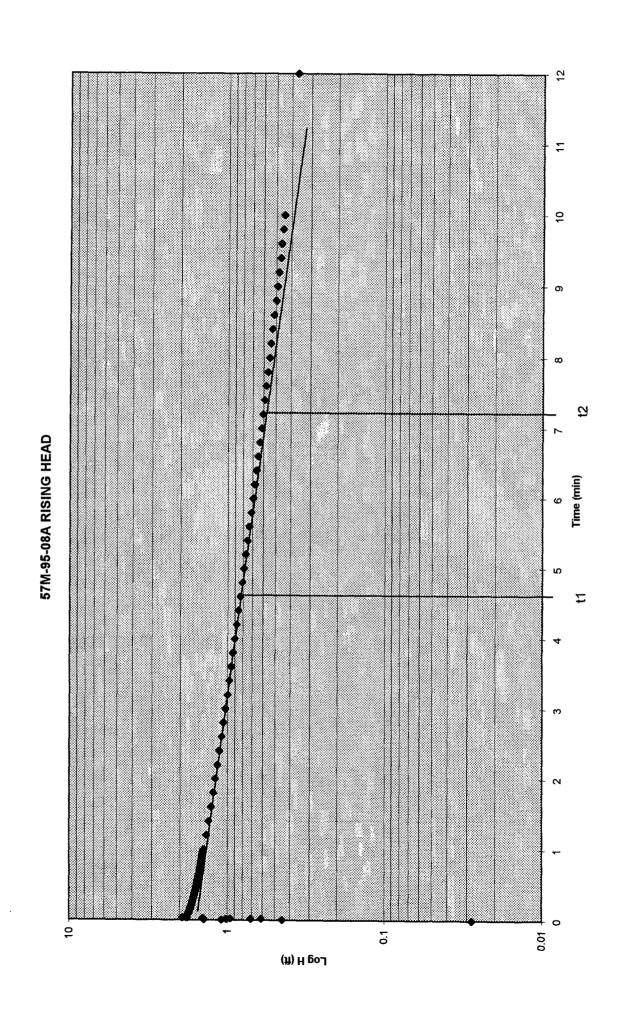
	1 10 11 (6:)			 	····
	delta H (ft.)				
0.5333	0.044			 	
0.55	0.041	~			
0.5666	0.031				
0.5833	0.025		1		
0.6	0.025				
0.6166	0.025				
0.6333	0.022				
0.65	0.022				
0.6666	0.019				
0.6833	0.019				
0.7	0.022				
0.7166	0.015				
0.7333	0.015				
0.75	0.015				
0.7666	0.012				
0.7833	0.012				
0.8	0.012				
0.8166	0.012				
0.8333	0.012				
0.85	0.012				
0.8666	0.012				
0.8833	0.012			-	
0.9	0.012				
0.9166	0.012				
0.9333	0.009				
0.95	0.009				
0.9666	0.012				
0.9833	0.012				
1	0.009				
1.2	0.009				
1.4	0.009				
1.6	0.006		<u> </u>		

Time (min)	delta H (ft.)							
0	0.028							
0.0033	0.449		ID: 57M-95					
0.0066	1.095	1	Test Date: 11/17/95					
0.01	1.418	I	Test Type: Rising Head					
0.0133	1.022	1	Well Diameter: 0.333 ft.					
0.0166	0.709	1	Boring Diameter: 0.833 ft.					
0.01	0.611		ened Interva					
0.0233	0.959	Wate	Water Column Height: 11.32 ft.					
0.0266	1.44							
0.0203	1.941							
0.0333	1.83							
0.0366	1.808							
0.0300	1.823							
0.0433	1.817							
0.0433	1.814							
0.0400	1.811							
0.0533	1.811							
0.0566	1.811							
0.03	1.801							
0.0633	1.804							
0.0666	1.798							
0.0000	1.798							
0.0733	1.795							
0.0766	1.792							
0.0708	1.785							
0.0833	1.785				-			
0.0866	1.776							
0.09	1.776							
0.0933	1.77							
0.0966	1.763							
0.0300	1.763							
0.1033	1.76	· · · · · · · · · · · · · · · · · · ·	<u> </u>		1			
0.1066	1.757							
0.1000	1.754				 			
0.1133	1.754	· -						
0.1166	1.751							
0.110	1.751		<u> </u>	-		 		
0.1233	1.747		-			 		
0.1266	1.744	· · · · · · · · · · · · · · · · · · ·						
0.1200	1.741							
0.1333	1.741		 	 	 			
0.1366	1.738							
0.1000	1.735		 					
0.1433	1.738							
0.1466	1.728				 			
0.1400	1.725		-					
0.1533	1.722				-			
0.1566	1.722	•		<u> </u>	 			
0.1300	1.719		 					
0.1633	1.719		-			-		
0.1033	1./19		<u> </u>			<u> </u>		

Time (min)	delta H (ft.)					
0.1666	1.716					
0.17	1.713	'				
0.1733	1.709					
0.1766	1.709					
0.18	1.709					
0.1833	1.706					
0.1866	1.706					
0.19	1.703					
0.1933	1.703					
0.1966	1.7					
0.1300	1.697					
0.2033	1.694					
0.2066	1.694					
0.2000	1.69					
0.2133				· · · · · · · · · · · · · · · · · · ·		
	1.69					
0.2166	1.687					
0.22	1.687					
0.2233	1.684					
0.2266	1.684					
0.23	1.681					
0.2333	1.681					
0.2366	1.678					
0.24	1.675					
0.2433	1.675	· · · · · · · · · · · · · · · · · · ·				
0.2466	1.671					
0.25	1.671					
0.2533	1.668					
0.2566	1.668					
0.26	1.668					
0.2633	1.665					
0.2666	1.665					
0.27	1.662					
0.2733	1.659		ļ			
0.2766	1.659					
0.28	1.656					
0.2833	1.656					
0.2866	1.656			**		
0.29	1.652					
0.2933	1.652					
0.2966	1.649					
0.3	1.649					
0.3033	1.649					
0.3066	1.643					
0.31	1.643					
0.3133	1.643				· · · · · · · · · · · · · · · · · · ·	
0.3166	1.643					
0.32	1.64					
0.3233	1.637					
0.3266	1.637					
0.33	1.637					
			· · · · · · · · · · · · · · · · · · ·			

Time (min)	delta H (ft.)			
0.3333	1.633			
0.35	1.627	 		
0.3666	1.621			
0.3833	1.611			
0.3033	1.605	 		
0.4166	1.599	 		
	1.599	 		
0.4333	1.586	 		 1
0.4666	1.58	 		
0.4833	1.573	 		
0.5	1.567			
0.5166	1.564	 		
0.5333	1.557			
0.55	1.551	 		
0.5666	1.545	 		
0.5833	1.538			
0.6	1.532			
0.6166	1.529	 		
0.6333	1.523	 		
0.65	1.519	 		
0.6666	1.513	 		
0.6833	1.507			
0.7	1.504	 		
0.7166	1.5			
0.7333	1.494			
0.75	1.491			
0.7666	1.485			
0.7833	1.481	 	,	
0.8	1.478			
0.8166	1.475			
0.8333	1.469			
0.85	1.462			
0.8666		 		
0.8833	1.456			
0.9				
0.9166		 		
0.9333				
0.95				
0.9666				
0.9833				
1				
1.2				
1.4				
1.6				
1.8				
2				
2.2	1.165			
2.4				
2.6	1.095			
2.8	1.063			

Time (min)	delta H (ft.)			1		
3	1.035					
3.2	1.003					
3.4	0.978					
3.6	0.949					
3.8	0.927					
4	0.899					
4.2	0.877					
4.4	0.854					
4.6	0.832					
4.8	0.807					
5	0.788					
5.2	0.769					
5.4	0.75					
5.6	0.731					
5.8	0.712					
6	0.693					
6.2	0.677					
6.4	0.661					
6.6	0.645					
6.8	0.63					
7	0.614					
7.2	0.601					
7.4	0.588					
7.6	0.576					
7.8	0.56					
8	0.547					
8.2	0.538					
8.4	0.525					
8.6	0.513					
8.8	0.5					
9	0.49					
9.2 9.4	0.481 0.468					
9.4	0.468					
9.8	0.452	, <u>,</u>				
10	0.432					
12	0.364				<u> </u>	
	0.304]			

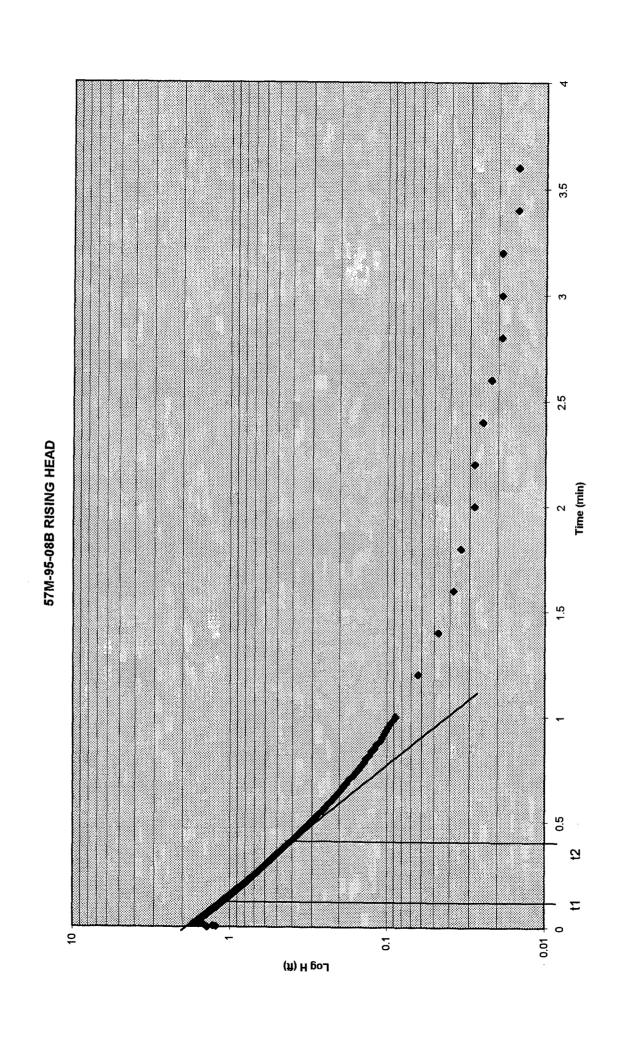


Time (min)	delta H (ft.)					
Ó	1.393	VA/all I	D. 5714.05	000		<u> </u>
0.0033	1.231		D: 57M-95			
0.0066	1.282		Test Date: 11/17/95			
0.01	1.459		Test Type: Rising Head			
0.0133	1.58		Well Diameter: 0.333 ft.			
0.0166	1.709		Boring Diameter: 0.833 ft.			
0.02	1.694			l (bgs): 18-2		
0.0233	1.64	Water	Column He	eight: 26.64	ft.	
0.0255	1.605				-	
0.0200	1.583					
0.0333	1.561					
0.0355						
	1.535					
0.04	1.516					
0.0433	1.497					
0.0466	1.475					
0.05	1.456					
0.0533	1.44					
0.0566	1.418					
0.06	1.399					
0.0633	1.383					
0.0666	1.361					
0.07	1.342					
0.0733	1.326					
0.0766	1.31					
0.08	1.292					
0.0833	1.272					
0.0866	1.257					
0.09	1.241					
0.0933	1.222					
0.0966	1.209					
0.1	1.193					
0.1033	1.178					
0.1066	1.162					
0.11	1.146					
0.1133	1.133					
0.1166	1.117					
0.12	1.105					
0.1233	1.092					
0.1266	1.076					
0.13	1.064					
0.1333	1.051					
0.1366	1.038					
0.14	1.022					
0.1433	1.013				 	
0.1466	1		 			
0.15	0.987					
0.1533	0.975				†	
0.1566	0.962			 		
0.1500	0.902				<u> </u>	
0.1633				 	<u> </u>	
0.1033	0.94		<u></u>	L	<u> </u>	

Time (min)	delta H (ft.)			
0.1666	0.927	 		
0.17	0.918	 		
0.1733	0.905	 		
0.1766	0.896		 	
0.18	0.886	 	 	
0.1833	0.877	 		
0.1866	0.864			
0.19	0.855		 	
0.1933	0.842	 	 	
0.1966	0.832	 		
0.2	0.823	 	 	
0.2033	0.813			
0.2066	0.804			
0.21	0.794	 		
0.2133	0.785			
0.2166	0.735	 		
0.2100	0.769			
0.2233	0.769			
0.2233	0.76	 		
0.2266	0.744	 		
0.2333	0.744			
0.2333	0.731			
0.2366	0.725			
0.2433	0.713		 	
0.2455	0.709	 		
0.2466	0.703	 		
0.2533	0.684			
0.2566	0.674			
0.26	0.668		 	
0.2633	0.661	 		
0.2666	0.655			
0.2000	0.635			
0.2733	0.639		 	
0.2766	0.633	 	 	
0.28	0.627 0.617	 		
0.2866	0.617	 		
0.28	0.604	 		
0.2933	0.598			
0.2933	0.590		 	
0.2900	0.585			
0.3033	0.579	 		
0.3066	0.573			
0.3000	0.566			
0.3133	0.56	 		
0.3166	0.554		 	
0.3100	0.547			
0.3233	0.541			
0.3255	0.538			
0.3260	0.532			
0.33	0.532			

Time (min)	delta H (ff.)	 		
0.3333	0.525	 	<u> </u>	
0.333	0.323	 		
0.3666	0.497			
0.3833	0.443	 		
0.4	0.418	 		
0.4166	0.395			
0.4333	0.373	 		
0.45	0.354			
0.4666	0.338	 		
0.4833	0.319	 		
0.5	0.304			
0.5166	0.288	 		
0.5333	0.275			
0.55	0.259			
0.5666	0.247			
0.5833	0.237			
0.6	0.224			
0.6166	0.215			
0.6333	0.205		_	
0.65	0.196			
0.6666	0.189			
0.6833	0.18			
0.7	0.174			
0.7166	0.164			
0.7333	0.158			
0.75	0.151			
0.7666	0.145			
0.7833	0.139			
8.0	0.136			
0.8166	0.129			
0.8333	0.126			
0.85	0.12			
0.8666	0.117			
0.8833	0.11			
0.9	0.107			
0.9166	0.104			
0.9333	0.101			
0.95	0.098			
0.9666	0.095			
0.9833	0.091			
1	0.088			
1.2	0.063			
1.4	0.047	-		
1.6	0.038			
1.8	0.034			
2				
2.2	0.028			
2.4				
2.6	0.022			
2.8				
2.0	0.018	 l	L	J

Time (min)	delta H (ft.)			
3	0.019			
3.2	0.019			
3.4	0.015			
3.6	0.015			



```
0
            0.028
            0.028
0.0033
0.0066
               0
  0.01
            0.431
0.0133
            1.051
0.0166
            1.689
            1.229
  0.02
0.0233
            0.403
0.0266
            0.647
            1.135
  0.03
            0.61
0.0333
0.0366
            0.591
            1.426
  0.04
                   max. drawdown = 1.661-0.028 = 1.63 ft.
            1.661
0.0433
0.0466
            1.088
  0.05
            1.398
            1.567
0.0533
0.0566
            1.473
  0.06
            1.257
0.0633
            1.192
            1.069
0.0666
            0.985
  0.07
0.0733
             0.91
0.0766
            0.825
             0.76
  0.08
0.0833
            0.713
            0.638
0.0866
  0.09
            0.591
0.0933
            0.553
            0.497
0.0966
            0.469
   0.1
0.1033
            0.441
            0.403
0.1066
            0.384
  0.11
0.1133
            0.356
            0.337
0.1166
            0.328
  0.12
            0.309
0.1233
0.1266
              0.3
  0.13
            0.281
0.1333
            0.272
0.1366
            0.262
            0.253
  0.14
            0.244
0.1433
            0.244
0.1466
  0.15
            0.234
0.1533
            0.215
0.1566
            0.225
  0.16
            0.215
0.1633
            0.206
0.1666
            0.215
```

0.17	0.197
0.1733	0.197
0.1766	0.206
0.18	0.187
0.1833	0.187
0.1866	0.187
0.19	0.178
0.1933	0.178
0.1966	0.178
0.2	0.168
0.2033	0.168
0.2066	0.168
0.21	0.168
0.2133	0.168
0.2166	0.168
0.22	0.159
0.2233	0.159
0.2266	0.159
0.23	0.159
0.2333	0.159
0.2366	0.159
0.24	0.15
0.2433	0.15
0.2466	0.15
0.25	0.15
	0.15
0.2533	
0.2566	0.15
0.26	0.15
0.2633	0.14
0.2666	0.14
0.27	0.14
0.2733	0.14
0.2766	0.14
	0.14
0.28	
0.2833	0.14
0.2866	0.14
0.29	0.14
0.2933	0.131
0.2966	0.131
0.3	0.131
0.3033	0.131
0.3066	0.131
0.31	0.131
0.3133	0.131
0.3166	0.131
0.32	0.131
0.3233	0.131
0.3266	0.131
0.33	0.131
0.3333	0.131
0.35	0.122

0.3666	0.122
0.3833	0.112
0.4	0.112
0.4166	0.112 0.103
0.4333 0.45	0.103
0.4666	0.103
0.4833	0.093
0.5	0.093
0.5166	0.093
0.5333	0.093
0.55	0.093
0.5666	0.084
0.5833	0.084 0.084
0.6 0.6166	0.084
0.6333	0.075
0.65	0.075
0.6666	0.075
0.6833	0.075
0.7	0.075
0.7166	0.075
0.7333	0.075
0.75 0.7666	0.065 0.065
0.7833	0.065
0.7033	0.065
0.8166	0.065
0.8333	0.065
0.85	0.056
0.8666	0.056
0.8833	0.056
0.9 0.9166	0.056 0.056
0.9333	0.056
0.95	0.056
0.9666	0.056
0.9833	0.056
1	0.056
1.2	0.037
1.4	0.037
1.6	0.028
1.8	0.028
2 2.2	0.028 0.028
2.2 2.4	0.028
2.6	0.018
2.8	0.018
. 3	0.018
3.2	0.018
3.4	0.018

3.6	0.018
3.8	0.018
4	0.018
4.2	0.018
4.4	0.018
4.6	0.018
4.8	0.018
5	0.018
5.2	0.018
5.4	0.018
5.6	0.018
5.8	0.018
6	0.018
6.2	0.018
6.4	0.018
6.6	0.018
6.8	0.018

ဖ 2 Time (min) ~ 0.01 Displacement (feet)

57M-96-09X Rising Head Test #1

```
0
               0
           0.009
0.0033
0.0066
           0.065
  0.01
           1.023
0.0133
           0.957
0.0166
           0.966
           0.929
  0.02
0.0233
           0.347
0.0266
           0.403
           0.825
  0.03
           0.591
0.0333
0.0366
           0.938
           1.304 max, drawdown = 1.30 ft
  0.04
           1.032
0.0433
            0.75
0.0466
            1.088
  0.05
            1.004
0.0533
0.0566
            0.882
            1.051
  0.06
            1.192
0.0633
0.0666
            0.994
  0.07
            1.21
            1.107
0.0733
0.0766
            0.957
  0.08
            0.891
            0.816
0.0833
0.0866
            0.732
  0.09
            0.685
            0.628
0.0933
            0.572
0.0966
    0.1
            0.534
            0.488
0.1033
0.1066
             0.45
  0.11
            0.431
            0.394
0.1133
0.1166
            0.375
  0.12
            0.356
0.1233
            0.328
0.1266
            0.319
   0.13
            0.309
0.1333
            0.281
0.1366
            0.281
            0.262
   0.14
            0.253
0.1433
0.1466
            0.253
            0.244
 0.15
            0.234
0.1533
0.1566
            0.225
            0.225
   0.16
            0.225
0.1633
 0.1666
            0.206
```

0.17	0.215
0.1733	0.197
0.1766	0.206
0.18	0.187
0.1833	0.197
0.1866	0.178
0.19	0.187
0.1933	0.178
0.1966	0.178
0.2	0.178
0.2033	0.178
0.2066	0.168
0.21	0.168
0.2133	0.168
0.2166	0.168
0.22	0.168
0.2233	0.168
0.2266	0.159
0.23	0.159
0.2333	0.159
0.2366	0.159 0.159
0.2433	0.159
0.2466	0.159
0.25	0.15
0.2533	0.15
0.2566	0.15
0.26	0.15
0.2633	0.15
0.2666	0.15
0.27	0.14
0.2733	0.14
0.2766	0.14
0.28	0.14
0.2833	0.14
0.2866	0.14 0.14
0.2933	0.14
0.2966	0.14
0.3	0.14 0.131
0.3033	0.131
0.31	0.131
0.3133	0.131
0.3166	0.131
0.32	0.131
0.3233	0.131
0.3266	0.131
0.33	0.131
0.3333	0.122
0.35	0.122

0.0000	0.422
0.3666	0.122
0.3833	0.112
0.4	0.112
0.4166	0.103
0.4333	0.103
	0.400
0.45	0.103
0.4666	0.103
0.4833	0.093
0.5	0.093
0.5166	0.093
0.5333	0.084
0.55	0.084
0.5666	0.084
	0.004
0.5833	0.084
0.6	0.084
0.6166	0.084
0.6333	0.075
0.65	0.075
0.6666	0.075
0.6833	0.075
0.7	0.075
0.7466	0.065
0.7166	
0.7333	0.065
0.75	0.065
0.7666	0.065
0.7833	0.065
0.8	0.065
0.8166	0.065
0.8333	0.065
0.85	0.056
0.8666	0.056
0.8833	0.056
0.9	0.056
0.0466	0.056
0.9166	0.056
0.9333	0.056
0.95	0.056
0.9666	0.056
0.9833	0.046
4	0.046
1	
1.2	0.037
1.4	0.028
1.6	0.028
1.8	0.028
2	0.018
2.2	0.018
	0.018
2.4	
2.6	0.018
	2.5.0

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0.47	4.00
0.17	1.06
0.1733	1.041
0.1766	1.023
0.18	1.013
0.1833	0.985
0.1866	0.966
0.19	0.947
0.1933	0.929
0.1966	0.919
0.2	0.901
0.2033	0.882
0.2066	0.872
0.21	0.854
0.2133	0.844
0.2166	0.835
0.22	0.816
0.2233	0.807
0.2266	0.797
0.23	0.788
0.2333	0.779
0.2366	0.769
0.24	0.76
0.2433	0.75
0.2466	0.741
	0.741
0.25	0.732
0.2533	0.722
0.2566	0.713
0.26	0.703
0.2633	0.703
0.2666	0.694
0.27	0.685
0.2733	0.685
0.2766	0.675
0.28	0.666
0.2833	0.666
0.2866	0.657
0.29	0.647
0.2933	0.647
0.2966	0.638
0.3	0.638
0.3033	0.638
0.3066	0.628
0.31	0.628
0.3133	0.619
0.3166	0.619
0.32	0.619
0.3233	0.61
0.3266	0.61
0.33	0.61
0.3333	0.6
0.35	0.591
0.55	0.551

0.3666	0.5.72
0.3833	0.563
0.4	0.553
0.4166	0.534
0.4333	0.534
0.45	0.525
0.4666	0.516
0.4833	0.516
0.5	0.506
0.5166	0.497
0.5333	0.497
0.55	0.488
	0.478
0.5666	
0.5833	0.478
0.6	0.478
0.6166	0.469
0.6333	0.469
0.65	0.459
0.6666	0.459
0.6833	0.45
0.7	0.45
	0.441
0.7166	
0.7333	0.441
0.75	0.441
0.7666	0.431
0.7833	0.431
0.7008	0.431
0.8166	0.422
0.8333	0.431
0.85	0.422
0.8666	0.412
0.8833	
	0.412
0.9	0.412
0.9166	0.412
0.9333	0.403
0.95	0.403
0.9666	0.403
0.9833	0.403
1	0.394
1.2	0.366
1.4	0.337
1.6	0.319
1.8	0.3
2	0.29
2.2	0.272
2.4	0.262
2.6	0.253
2.8	0.244
3	0.234
3.2	0.225
3.4	0.215
5.4	0.213

3.6	0.206
3.8	0.206
4	0.197
4.2	0.197
4.4	0.187
4.6	0.187
4.8	0.178
5	0.178
5.2	0.168
5.4	0.168
5.6	0.168
5.8	0.159
6	0.159
6.2	0.15
6.4	0.15
6.6	0.15
6.8	0.15
7	0.15
7.2	0.14
7.4	0.14
7.6	0.14
7.8	0.14
8	0.14
8.2	0.131
8.4	0.131
8.6	0.131
8.8	0.131
9	0.131
9.2	0.131
9.4	0.131
9.6	0.122
9.8	0.131
10	0.131
12	0.122

9 œ 57M-96-10X Rising Head Test #1 Time (min) 0.1 0.01

Displacement (feet)

```
0
           2.187
0.0033
           2.187
0.0066
           2.187
           2.187
  0.01
0.0133
           2.431
           2.759
0.0166
  0.02
             3.35
           3.566
0.0233
           3.482
0.0266
           3.613
  0.03
           3.726
0.0333
0.0366
           3.416
           3.125
  0.04
           3.379
0.0433
           3.435
0.0466
             4.43
  0.05
             4.27
0.0533
            4.392
0.0566
            4.702 max. drawdown = 4.702-2.187 = 2.52 ft.
  0.06
            4.477
0.0633
            4.467
0.0666
            4.383
  0.07
            4.326
0.0733
0.0766
            4.261
            4.214
  0.08
0.0833
            4.158
0.0866
            4.139
  0.09
            4.082
0.0933
            4.017
0.0966
             3.97
            3.904
    0.1
0.1033
            3.867
0.1066
            3.838
            3.792
   0.11
0.1133
            3.754
0.1166
            3.716
   0.12
            3.688
0.1233
            3.651
0.1266
            3.623
   0.13
            3.594
            3.585
0.1333
0.1366
            3.538
   0.14
            3.519
0.1433
            3.501
 0.1466
            3.472
            3.444
   0.15
            3.425
 0.1533
            3.407
 0.1566
            3.388
   0.16
 0.1633
             3.369
             3.341
 0.1666
```

6.47	0.000
0.17	3.322
0.1733	3.303
0.1766	3.285
0.18	3.266
0.1833	3.238
0.1866	3.219
0.19	3.2
0.1933	3.172
0.1966	3.153
0.2	3.134
0.2033	3.106
0.2066	3.097
0.21	3.078
0.2133	3.059
0.2166	3.041
0.22	3.031
0.2233	3.012
0.2266	3.003
0.23	2.984
0.2333	2.975
0.2366	2.966
0.24	2.947
0.2433	2.937
0.2466	2.928
	2.920
0.25	
0.2533	2.9
0.2566	2.9
0.26	2.881
0.2633	2.872
0.2666	2.862
0.27	2.862
0.2733	2.853
0.2766	2.844
0.2700	
	2.834
0.2833	2.825
0.2866	2.825
0.29	2.815
0.2933	2.806
0.2966	2.806
0.3	2.797
0.3033	2.797
0.3066	2.787
0.31	2.778
0.3133	2.778
0.3166	2.778
0.32	2.768
0.3233	2.768
0.3266	2.759
0.33	2.759
0.3333	2.759
0.35	2.731

0.3666	2.712
0.3833	2.703
0.4	2.693
0.4166	2.684
0.4333	2.675
0.45	2.665
0.4666	2.656
0.4833	2.646
0.5	2.646
0.5166	2.637
0.5333	2.628
0.55	2.618
0.5666	2.618
0.5833	2.609
0.000	2.609
-	
0.6166	2.6
0.6333	2.6
0.65	2.59
0.6666	2.59
0.6833	2.581
0.7	2.581
0.7166	2.571
0.7333	
	2.571
0.75	2.562
0.7666	2.562
0.7833	2.562
0.8	2.562
0.8166	2.553
0.8333	2.553
0.85	2.553
	2.543
0.8666	
0.8833	2.534
0.9	2.534
0.9166	2.534
0.9333	2.534
0.95	2.524
0.9666	2.524
0.9833	2.515
1	2.515
1.2	2.478
1.4	2.449
1.6	2.431
1.8	2.402
2	2.393
2.2	2.374
2.4	2.355
2.6	2.346
2.8	2.327
3	2.318
3.2	2.309
3.4	2.299
	

3.6	2.28
3.8	2.271
4	2.271
4.2	2.262
4.4	2.252
4.6	2.243
4.8	2.243
5	2.233
5.2	2.224
5.4	2.215
5.6	2.215
5.8	2.205
6	2.205
6.2	2.196
6.4	2.187
6.6	2.187
6.8	2.177
7	2.177
7.2	2.177
7.4	2.168
7.6	2.158
7.8	2.158
8	2.158
8.2	2.158
8.4	2.149
8.6	2.149
8.8	2.14
9	2.14
9.2	2.13
9.4	2.13
9.6	2.13
9.8	2.121
10	2.121

9 ß 57M-96-10X Rising Head Test #2 Time (min) $^{\circ}$ 0.01

Displacement (feet)

```
0.187
     0
           0.872
0.0033
           1.041
0.0066
           0.938
  0.01
0.0133
           0.797
0.0166
           1.032
  0.02
           1.323
           1.051
0.0233
0.0266
           0.713
  0.03
           0.516
0.0333
           0.685
           1.408
0.0366
  0.04
           1.614
0.0433
           1.811
0.0466
           1.905
           2.196
  0.05
            2.44
0.0533
           2.543
0.0566
           2.675 max. drawdown = 2.657 - 0.187 = 2.47 ft.
  0.06
           2.459
0.0633
0.0666
           2.468
           2.393
  0.07
0.0733
           2.365
0.0766
           2.318
            2.28
  0.08
           2.243
0.0833
0.0866
           2.215
  0.09
           2.187
           2.158
0.0933
0.0966
            2.13
           2.102
   0.1
           2.083
0.1033
            2.065
0.1066
  0.11
            2.036
            2.018
0.1133
0.1166
            1.999
  0.12
            1.989
0.1233
            1.971
0.1266
            1.961
            1.952
  0.13
0.1333
            1.943
0.1366
            1.933
  0.14
            1.924
0.1433
            1.914
            1.914
0.1466
   0.15
            1.905
0.1533
            1.896
0.1566
            1.896
   0.16
            1.886
            1.877
0.1633
0.1666
            1.877
```

0.17	1.867
0.1733	1.858
0.1766	1.858
0.18	1.849
0.1833	1.849
0.1866	1.839
0.19	1.839
0.1933	1.839
0.1966	1.83
0.2	1.83
0.2033	1.821
0.2066	1.821
0.21	1.811
0.2133	1.811
0.2166	1.802
	1.802
0.22	
0.2233	1.802
0.2266	1.792
0.23	1.792
0.2333	1.783
0.2366	1.783
0.24	1.774
0.2433	1.774
	1.774
0.2466	1.774
0.25	1.764
0.2533	1.764
0.2566	1 764
	1.764
0.26	1.755
0.2633	1.755
0.2666	1.745
0.27	1.745
0.2733	1.745
0.2766	1.736
0.28	1.736
	1.700
0.2833	1.736
0.2866	1.727
0.29	1.727
0.2933	1.727
0.2966	1.717
0.3	1.717
0.3033	1.717
0.3066	1.717
	1.708
0.31	1.708
0.3133	1.708
0.3166	1.708
0.32	1.698
0.3233	1.698
0.3266	1.698
0.33	1.689
0.3333	1.689
0.35	1.661

0.3666	1.652
0.3833	1.633
0.4	1.623
0.4166	1.605
0.4333	1.586
0.45	1.576
0.4666	1.558
0.4833	1.539
0.5	1.529 1.52
0.5166 0.5333	1.52
0.555	1.492
0.5666	1.473
0.5833	1.464
0.6	1.445
0.6166	1.436
0.6333	1.426
0.65	1.408
0.6666	1.398
0.6833	1.389
0.7	1.37
0.7166	1.37
0.7333 0.75	1.351 1.342
0.75 0.7666	1.342
0.7833	1.332
0.7000	1.304
0.8166	1.295
0.8333	1.286
0.85	1.276
0.8666	1.267
0.8833	1.257
0.9	1.248
0.9166	1.239
0.9333	1.229
0.95	1.21 1.201
0.9666 0.9833	1.201
0.9033	1.182
1.2	1.06
1.4	0.957
1.6	0.872
1.8	0.797
2	0.732
2.2	0.666
2.4	0.61
2.6	0.563
2.8	0.525
3 3.2	0.488 0.45
3.2 3.4	0.422
J.4	U.744

3.6	0.394
3.8	0.366
4	0.347
4.2	0.319
4.4	0.309
4.6	0.291
4.8	0.272
5	0.253
5.2	0.244
5.4	0.234
5.6	0.225
5.8	0.215
6	0.206
6.2	0.197
6.4	0.187
6.6	0.178
6.8	0.178
7	0.169
7.2	0.169
7.4	0.159
7.6	0.15
7.8	0.15
8	0.15
8.2	0.14
8.4	0.14
8.6	0.131
8.8	0.131
9	0.122
9.2	0.122
9.4	0.122
9.6	0.122
9.8	0.112
10	0.112
12	0.103
14	0.084

12 10 Time (min) ~ 10 0.01 Displacement (feet)

57M-96-11X Rising Head Test #1

```
0.103
     0
0.0033
           0.863
0.0066
            1.07
           0.384
  0.01
           0.225
0.0133
0.0166
           0.281
           0.291
  0.02
           0.685
0.0233
0.0266
           0.582
            0.15
  0.03
           0.422
0.0333
            0.15
0.0366
  0.04
           0.122
0.0433
            1.21
           1.023
0.0466
           0.919
  0.05
0.0533
           1.445
           1.173
0.0566
  0.06
           1.464
0.0633
           1.661
0.0666
           1.717
           1.698
  0.07
0.0733
           1.886
0.0766
           1.971
  0.08
           2.065
0.0833
           2.111
0.0866
           2.215
  0.09
           2.233
0.0933
            2.29
           2.309
0.0966
           2.355 max. drawdown = 2.355-(-0.319) = 2.67 ft.
   0.1
0.1033
           2.327
           2.299
0.1066
  0.11
           2.252
0.1133
           2.224
0.1166
           2.187
  0.12
           2.158
0.1233
             2.13
0.1266
           2.102
  0.13
            2.083
            2.055
0.1333
0.1366
            2.036
  0.14
            2.018
0.1433
            1.999
             1.98
0.1466
   0.15
            1.971
0.1533
            1.952
            1.943
0.1566
            1.933
   0.16
            1.924
0.1633
0.1666
            1.914
```

0.17	1.905
0.1733	1.896
0.1766	1.896
0.18	1.886
0.1833	1.877
0.1866	1.877
0.19	1.867
0.1933	1.867
0.1966	1.858
0.2	1.849
0.2033	1.849
0.2066	1.839
0.21	1.839
0.2133	1.83
0.2166	1.83
0.22	1.821
0.2233	1.821
0.2266	1.811
0.23	1.811
0.2333	1.802
0.2366	1.802
0.24	1.792
	1.792
0.2433	
0.2466	1.792
0.25	1.783
0.2533	1.783
0.2566	1.774
0.26	1.764
0.2633	1.764
0.2666	1.764
0.27	1.755
0.2733	1.755
0.2766	1.755
0.28	1.745
	1.745
0.2833	1.745
0.2866	1.736
0.29	1.736
0.2933	1.736
0.2966	1.736
	1.727
0.3	
0.3033	1.727
0.3066	1.727
0.31	1.717
0.3133	1.717
0.3166	1.708
0.32	1.708
0.3233	1.708
0.3266	1.698
0.33	1.698
0.3333	1.698
0.333	1.67
0.35	1.07

0.3666	1.652
0.3833	1.633
0.4	1.614
0.4166	1.595
0.4333	1.586
0.45	1.567
0.4666	1.548
0.4833	1.539
0.5	1.52
0.5166	1.501
0.5333	1.492 1.473
0.55 0.5666	1.473
0.5833	1.445
0.5055	1.426
0.6166	1.417
0.6333	1.398
0.65	1.389
0.6666	1.37
0.6833	1.361
0.7	1.351
0.7166	1.332
0.7333	1.323
0.75	1.304
0.7666 0.7833	1.295 1.286
0.7833	1.267
0.8 0.8166	1.257
0.8333	1.248
0.85	1.239
0.8666	1.22
0.8833	1.21
0.9	1.201
0.9166	1.192
0.9333	1.173
0.95	1.163
0.9666	1.154
0.9833	1.145 1.135
1 1.2	0.985
1.4	0.903
1.6	0.779
1.8	0.685
2	0.61
2.2	0.544
2.4	0.478
2.6	0.413
2.8	0.366
3	0.319
3.2	0.281
3.4	0.234

3.6	0.197
3.8	0.169
4	0.14
4.2	0.112
4.4	0.084
4.6	0.056
4.8	
	0.037
5	0.018
5.2	0
5.4	-0.018
5.6	-0.037
5.8	-0.046
6	-0.065
6.2	-0.084
6.4	-0.093
6.6	-0.103
6.8	-0.122
7	-0.131
7.2	-0.14
7.4	-0.15
7.6	-0.159
7.8	-0.168
7.0 8	-0.178
8.2	-0.178 -0.187
8.4	-0.187
8.6	
	-0.197
8.8	-0.206
9	-0.215
9.2	-0.225
9.4	-0.234
9.6	-0.234
9.8	-0.244
10	-0.253
12	-0.319

10 œ Time (min) 8 10 0.1 0.01 Displacement (feet)

57M-96-11X Rising Head Test #2

```
0.056
    0
           0.506
0.0033
0.0066
           0.572
           0.516
  0.01
0.0133
           0.244
0.0166
           0.028
  0.02
           0.075
           0.234
0.0233
0.0266
           0.112
  0.03
           0.056
           0.028
0.0333
          -0.056
0.0366
  0.04
          -0.084
0.0433
          -0.009
           0.272
0.0466
           0.337
  0.05
0.0533
           0.356
           0.197
0.0566
           0.178
  0.06
            0.14
0.0633
0.0666
           0.168
           0.384
  0.07
0.0733
           0.366
0.0766
           0.281
           0.272
  0.08
0.0833
           0.591
0.0866
           0.938
  0.09
           0.966
0.0933
           1.032
0.0966
           0.985
           0.976
   0.1
0.1033
           1.248
           1.332
0.1066
           1.351
  0.11
            1.417
0.1133
            1.539
0.1166
  0.12
            1.67
            1.698
0.1233
0.1266
            1.792
  0.13
            1.811
0.1333
            1.971
             2.13
0.1366
            2.046
  0.14
             2.14
0.1433
            2.168
0.1466
            2.177
   0.15
            2.196 max drawdown = 2.196 - 0.056 = 2.14 ft.
0.1533
            2.158
0.1566
   0.16
            2.158
0.1633
             2.13
0.1666
            2.102
```

0.17	2.093
	2.033
0.1733	
0.1766	2.055
0.18	2.036
0.1833	2.027
0.1866	2.008
0.19	1.999
0.1933	1.98
0.1966	1.971
0.2	1.961
0.2033	1.952
0.2066	1.942
0.21	1.933
0.2133	1.924
	1.924
0.2166	
0.22	1.914
0.2233	1.905
0.2266	1.905
0.23	1.896
0.2333	1.886
0.2366	1.886
0.24	1.886
0.2433	1.877
0.2466	1.877
0.25	1.867
0.2533	1.867
0.2566	1.858
0.2500	1.858
	1.858
0.2633	
0.2666	1.849
0.27	1.849
0.2733	1.839
0.2766	1.839
0.28	1.839
0.2833	1.83
0.2866	1.83
0.29	1.82
0.2933	1.82
0.2966	1.82
0.3	1.811
0.3033	1.811
0.3066	1.811
0.300	
	1.802 1.802
0.3133	
0.3166	1.802
0.32	1.792
0.3233	1.792
0.3266	1.792
0.33	1.783
0.3333	1.783
0.35	1.764

0.3666	1.736
0.3833	1.717
0.4	1.698
0.4166	1.68
0.4333	1.661
0.45	1.651
0.4666	1.633
0.4833	1.623
0.5	1.605
0.5166	1.586
0.5333	1.576
0.55	1.558 1.539
0.5666 0.5833	1.539
0.5655	1.529
0.6166	1.492
0.6333	1.483
0.65	1.464
0.6666	1.454
0.6833	1.436
0.7	1.417
0.7166	1.407
0.7333	1.389
0.75	1.379
0.7666	1.37
0.7833	1.351
0.8	1.342
0.8166	1.323
0.8333	1.314
0.85	1.295
0.8666	1.285
0.8833	1.276
0.9	1.267 1.248
0.9166 0.9333	1.248
0.9333	1.236
0.9666	1.21
0.9833	1.201
1	1.192
1.2	1.032
1.4	0.919
1.6	0.816
1.8	0.732
2	0.657
2.2	0.591
2.4	0.525
2.6	0.478
2.8	0.431
3	0.394
3.2	0.356
3.4	0.319

3.6	0.3
3.8	0.272
4	0.244
4.2	0.225
4.4	0.206
4.6	0.187
4.8	0.178
5	0.168
5.2	0.15
5.4	0.14
5.6	0.131
5.8	0.122
6	0.122
6.2	0.112
6.4	0.103
6.6	0.103
6.8	0.093
7	0.093
7.2	0.084
7.4	0.084
7.6	0.084
7.8	0.084
8	0.075
8.2	0.075
8.4	0.075
8.6	0.075
8.8	0.065
9	0.065
9.2	0.065

G 9 Time (min) 0.01 Displacement (feet)

57M-96-12X Rising Head Test #1

```
0
           0.018
           0.244
0.0033
           0.431
0.0066
  0.01
           0.422
           0.206
0.0133
           -0.056
0.0166
           -0.028
  0.02
0.0233
           0.037
           0.215
0.0266
           0.225
  0.03
           0.272
0.0333
0.0366
           0.488
           0.525
  0.04
           0.309
0.0433
            0.131
0.0466
            0.441
  0.05
             0.75
0.0533
0.0566
            0.497
  0.06
            0.816
            0.994
0.0633
0.0666
            0.732
            1.436
  0.07
0.0733
            1.558
0.0766
            1.201
            1.914
  0.08
            2.224
0.0833
            1.867
0.0866
            2.243
   0.09
                  max. drawdown = 2.506 - 0.018 = 2.49 ft.
            2.506
0.0933
            2.271
0.0966
            2.158
    0.1
0.1033
            2.271
0.1066
            2.215
             2.14
   0.11
            2.177
0.1133
0.1166
            2.158
            2.102
   0.12
            2.102
0.1233
 0.1266
            2.093
   0.13
            2.064
            2.046
 0.1333
 0.1366
            2.046
            2.018
   0.14
            2.008
 0.1433
 0.1466
            1.999
   0.15
            1.989
             1.98
 0.1533
 0.1566
             1.98
             1.961
   0.16
 0.1633
             1.952
             1.952
 0.1666
```

0.17	1.942
0.1733	1.942
0.1766	1.942
0.18	1.933
0.1833	1.933
	1.924
0.1866	
0.19	1.914
0.1933	1.914
0.1966	1.905
0.2	1.905
0.2033	1.905
0.2066	1.905
0.21	1.896
0.2133	1.896
0.2166	1.886
0.22	1.886
0.2233	1.886
0.2266	1.877
0.23	1.877
0.2333	1.867
0.2366	1.867
0.24	1.858
0.2433	1.858
0.2466	1.858
0.25	1.849
0.2533	1.849
	1.849
0.2566	
0.26	1.839
0.2633	1.83
0.2666	1.839
0.27	1.83
0.2733	1.83
0.2766	1.82
0.28	1.82
0.2833	1.811
0.2866	1.811
0.29	1.811
0.2933	1.792
0.2966	1.792
0.3	1.792
0.3033	1.792
0.3066	1.783
0.31	1.783
0.3133	1.773
0.3166	1.773
0.32	1.773
0.3233	1.764
0.3266	1.764
0.33	1.755
0.3333	1.755
0.35	1.736

0.3666	1.727
0.3833	1.708
0.4	1.698
0.4166	1.689
0.4333	1.68
0.45	1.661
0.466	1.651
0.4833	1.642
0.4055	1.633
0.5166	1.614
0.5100	1.614
0.555	1.586
	1.576
0.5666	1.558
0.5833	1.556
0.6	1.546
0.6166	1.529
0.6333	
0.65	1.501
0.6666	1.492
0.6833	1.473
0.7	1.464
0.7166	1.445
0.7333	1.426
0.75	1.417
0.7666	1.407
0.7833	1.398
8.0	1.379
0.8166	1.37
0.8333	1.351
0.85	1.332
0.8666	1.332
0.8833	1.314
0.9	1.304
0.9166	1.295
0.9333	1.276
0.95	1.267
0.9666	1.248
0.9833	1.238
1	1.229
1.2	1.06
1.4	0.938
1.6	0.844
1.8	0.75
2	0.675
2.2	0.61
2.4	0.553
2.6	0.497
2.8	0.459
3	0.413
3.2	0.375
3.4	0.337

3.6	0.309
3.8	0.29
4	0.262
4.2	0.244
4.4	0.225
4.6	0.206
4.8	0.197
5	0.178
5.2	0.178
5.4	0.159
5.6	0.15
5.8	0.14
6	0.131
6.2	0.131
6.4	0.131
6.6	0.122
6.8	0.112
7	0.112
7.2	0.112
7.4	0.103
7.6	0.093
7.8	0.093

9 2 Time (min) 0.01 0.1 Displacement (feet)

57M-96-12X Rising Head Test #2

```
0.028
     0
            0.028
0.0033
0.0066
            0.112
  0.01
            0.647
0.0133
            1.107
            1.192
0.0166
             1.22
  0.02
            0.741
0.0233
            1.407
0.0266
            1.792
  0.03
0.0333
            1.783
0.0366
            1.961
            2.355
  0.04
0.0433
            2.393
             2.44 max drawdown = 2.44-0.028 = 2.41 ft.
0.0466
            2.365
  0.05
            2.327
0.0533
             2.28
0.0566
  0.06
            2.233
            2.196
0.0633
            2.158
0.0666
  0.07
            2.111
            2.083
0.0733
0.0766
            2.046
  0.08
            2.008
0.0833
            1.971
0.0866
            1.942
  0.09
            1.905
            1.886
0.0933
0.0966
            1.858
    0.1
             1.83
0.1033
             1.83
0.1066
            1.783
  0.11
            1.764
0.1133
            1.745
0.1166
            1.727
            1.708
  0.12
0.1233
            1.689
0.1266
             1.67
  <sup>=</sup> 0.13
            1.661
            1.642
0.1333
0.1366
            1.633
   0.14
            1.614
            1.605
0.1433
0.1466
            1.595
   0.15
            1.586
            1.576
0.1533
0.1566
            1.567
   0.16
            1.558
0.1633
            1.548
0.1666
            1.539
```

	4 50
0.17	1.53
0.1733	1.53
0.1766	1.52
0.18	1.511
0.1833	1.501
0.1866	1.501
0.19	1.492
0.1933	1.492
0.1966	1.483
0.2	1.483
0.2033	1.473
0.2066	1.473
0.21	1.464
0.2133	1.464
0.2166	1.464
0.22	1.454
0.2233	1.445
0.2266	1.445
0.23	1.445
0.2333	1.436
0.2366	1.436
0.24	1.436
0.2433	1.436
0.2466	1.426
0.25	1.426
0.2533	1.426
0.2566	1.417
0.26	1.417
0.2633	1.417
0.2666	1.407
0.27	1.407
0.2733	1.407
0.2766	1.407
0.28	1.407
0.2833	1.398
0.2866	1.398
0.29	1.398
0.2933	1.398
0.2966	1.398
0.3	1.389
0.3033	1.389
0.3066	1.389
0.31	1.379
0.3133	1.379
0.3166	1.379
0.32	1.379
0.3233	1.379
0.3266	1.379
0.33	1.379
0.3333	1.37
0.35	1.361
3.55	

0.3666	1.351
	1.342
0.3833	
0.4	1.332
0.4166	1.323
0.4333	1.323
0.45	1.314
0.4666	1.304
0.4833	1.295
0.5	1.285
0.5166	1.285
0.5333	1.276
0.55	1.267
0.5666	1.267
0.5833	1.257
0.6	1.248
0.6166	1.239
0.6333	1.229
0.65	1.229
0.6666	1.22
0.6833	1.201
0.7	1.182
0.7166	1.163
0.7333	1.135
0.75	1.117
0.7666	1.098
0.7833	1.079
0.8	1.06
0.8166	1.041
0.8333	1.023
0.85	1.004
0.8666	0.995
0.8833	0.976
0.9	0.957
0.9166	0.938
0.9333	0.929
0.95	0.91
0.9666	0.891
0.9833	0.882
1	0.863
1.2	0.685
1.4	0.572
1.6	0.478
1.8	0.403
2	0.347
2.2	0.3
2.4	0.253
2.6	0.225
2.8	0.197
3	0.169
3.2	0.15
3.4	0.14
♥.¬	U. 17

က 2.5 57M-96-13X Rising Head Test #1 8 0.1

Displacement (feet)

Time (min)

```
0.741
     0
           1.989
0.0033
0.0066
           2.609
           1.896
  0.01
0.0133
           1.464
0.0166
            2.29
           2.675
  0.02
0.0233
           2.524
           3.022
0.0266
                  max. drawdown = 3.078-0.675 = 2.40 ft
  0.03
           3.078
0.0333
           3.003
0.0366
           2.947
             2.9
  0.04
0.0433
           2.853
           2.815
0.0466
  0.05
           2.778
            2.74
0.0533
0.0566
           2.693
           2.656
  0.06
           2.628
0.0633
            2.59
0.0666
  0.07
           2.562
           2.524
0.0733
           2.496
0.0766
  0.08
           2.468
            2.44
0.0833
           2.412
0.0866
  0.09
           2.393
           2.374
0.0933
0.0966
           2.346
   0.1
           2.327
0.1033
           2.309
           2.299
0.1066
  0.11
             2.28
0.1133
            2.262
           2.252
0.1166
   0.12
           2.243
0.1233
            2.224
0.1266
            2.215
   0.13
            2.205
0.1333
            2.196
0.1366
            2.177
   0.14
            2.177
0.1433
            2.158
            2.158
0.1466
   0.15
            2.149
0.1533
             2.14
0.1566
             2.14
   0.16
             2.13
            2.121
0.1633
            2.111
 0.1666
```

0.47	0.444
0.17	2.111
0.1733	2.102
0.1766	2.102
0.18	2.093
0.1833	2.093
0.1866	2.083
0.19	2.083
0.1933	2.074
0.1966	2.074
0.2	2.064
0.2033	2.074
0.2066	2.064
0.2000	2.055
0.2133	2.055
0.2166	2.046
0.22	2.055
0.2233	2.046
0.2266	2.046
0.23	2.046
0.2333	2.036
0.2366	2.036
0.24	2.036
0.2433	2.027
0.2466	2.027
0.25	2.027
0.2533	2.027
0.2566	2.018
0.26	2.018
0.2633	2.018
0.2666	2.018
0.27	2.018
0.2733	2.018
0.2766	2.008
0.28	2.008
0.2833	1.999
0.2866	2.008
0.29	1.999
0.2933	1.999
0.2966	1.999
0.3	1.999
0.3033	1.999
0.3066	1.989
0.31	1.989
0.3133	1.989
0.3166	1.989
0.32	1.989
0.3233	1.98
0.3266	1.98
0.33	1.98
0.3333	1.98
0.333	1.961
0.35	1.901

0.2666	1.952
0.3666	
0.3833	1.952
0.4	1.942
0.4166	1.933
0.4333	1.924
0.45	1.914
0.4666	1.905
0.4833	1.905
0.5	1.896
0.5166	1.886
0.5333	1.877
0.55	1.877
0.5666	1.867
0.5833	1.858
0.6	1.858
0.6166	1.849
	1.839
0.6333	
0.65	1.839
0.6666	1.83
0.6833	1.82
0.7	1.82
0.7166	1.811
0.7333	1.792
0.75	1.773
0.7666	1.755
0.7833	1.736
0.8	1.717
0.8166	1.698
0.8333	1.68
0.85	1.661
0.8666	1.642
0.8833	1.623
0.9	1.605
0.9166	1.586
0.9333	1.567
0.95	1.558
0.9666	1.539
0.9833	1.52
1	1.511
1.2	1.323
1.4	1.192
1.6	1.088
1.8	1.013
2	0.947
	0.891
2.2	
2.4	0.854
2.6 .	0.816
	0.788
2.8	
3	0.76
3.2	0.741
3.4	0.722

3.6	0.713
3.8	0.703
4	0.685
4.2	0.685
4.4	0.675
4.6	0.675

4.5 ന 2.5 Time (min) 101 0.1 Displacement (feet)

57M-96-13X Rising Head Test #2

HYDRAULIC GRADIENT AND GROUNDWATER FLOW VELOCITY CALCULATIONS

Harding Lawson Associates

C:\FDRITABL\57\APPCOVER 9144-03 -

ESTIMATES OF GROUNDWATER FLOW VELOCITY

$$V = \frac{Ki}{n}$$

NY

V = Average Linear Velocity

L = Horizontal Conductivity

K = Hydraulic Conductivity

N = Porosity

AREA 2

Maximum Estimate

 $K = 2.4 \times 10^{-1}$ ft/min = 345.6 feet/day i = 0.0127 ft/ft maximum mean (July 23, 1996) n = 0.3

$$V = \frac{(345.6 \text{ ft/day}) (0.0127 \text{ft/ft})}{0.3} = 14 \text{ feet/day}$$

Minimum Estimate

 $K = 8.3 \times 10^{-4}$ ft/min = 1.19 ft/day (Bouwer and Rice Method 57m.95.08A) i = 0.0095 Minimum Mean (Dec. 7, 1995) n = 0.3

$$V = \frac{(1.19 \text{ ft/day})(0.0095 \text{ ft/ft})}{0.3} = 0.038 \text{ ft/day}$$

APPENDIX F-2

Mean

 $K = 3.24 \times 10^{-2} \text{ ft/min} = 46.7 \text{ ft/day}$ i = 0.01 ft/ftn = 0.3

$$V = \frac{(46.7) (0.01 \text{ft/ft})}{0.3} = 1.56 \text{ ft/day}$$

AREA 3

Minimum Estimate

 $K=1.36 \times 10^{-3} \ ft/min=1.96 \ ft/day$ (as determined by Bouwer & Rice at 57m.96.10X) i = 0.022 ft/ft mean of Jean. 15 gradients n=0.3

$$V = \frac{(1.96 \text{ ft/day}) (0.022)}{0.3} = 0.14 \text{ ft/day}$$

Maximum Estimate

 $K=1.1 \ x \ 10^{-2} \ ft/min = 15.84 \ feet/day$ (as determined by Bouwer & Rich at 57m.95.03x) i = 0.022 ft/ft n=0.3

$$V = \frac{(15.84 \text{ ft/day}) (0.022 \text{ ft/ft})}{0.3} = 1.16 \text{ feet/day}$$

Mean

$$K = 3.54 \times 10^{-3} \text{ ft/min} = 5.1 \text{ ft/day}$$

 $i = 0.022 \text{ ft/ft}$
 $n = 0.3$

$$V = \frac{(5.1 \text{ ft/day}) (0.022)}{0.3} = 0.37 \text{ ft/day}$$

Distance between wells	December 7, 1995 Water Elevation (msf)				Horizontal Gradient	-
		γŞ	/ Dist	11	•==	
G3M-92-02X	224.72	2.75	,	456 =	900	
	221.97	i				
1	223				1	
57M-95-08A	221.19	1.81	_	 	0.015	
	224.72	i			6	
57P-95-01A	219.5	5.77	· ·	₩ 49C	0.00	
			Average	ا	0.010	
			Geo. Mean Median		0.009	
					Vertical (Vertical Gradients
57P-95-01A	219.5	3,0	•	ŀ	920	3
57P-95-01B	219.75	6.6	n	I	0.020	upward
	220.82	5	7.		5	
57M-95-04B	220.83	0.0	†. 01		0.001	upward
	221.19	9				P.
57M-95-08B	221.01	0.18	CCI		0.012	downward
Notes: *: Distanc	Distance seperating middle of well screens mean sea level	eens				



Distance between wells	March 26, 1996 Water Elevation (ms)			1	Horizontal Gradient
		βh	Dist	ı,	
G3M-92-02X	225.5	3.08	456	H	0.007
	222.42		2		
S7M-95-06X	223.75	°		ı	e c
57M-95-08A	221.47	07:7	110	ľ	(T)
	225.5	70 F	798	I	900
57P-95-01A	220.65	6	t OC	I	6000
			Average		0.012
Vertical Gradients			Geo. Mean Median		0.000
57P-95-01A	220.65	80	ď	ı	0.021
57P-95-01B	220.93	0.70	'n	1	o.oo tamara
57M-95-04A	221.11	8	7	i	7 00 0
57M-95-04B	221.13	70.0	,	I	v.vo. upwatu
57M-95-08A	221.47	11	- -	I	0 007 downward
57M-95-08B	221.36			1	1

*: Distance seperating middle of well screens msl mean sea level

Notes:



Distance between welk	7.	July 23, 1996 Waler Elevation (msl)			H	Horizontal Gradient	
!!	Г	226.19	/ ųջ	Dist	11	•=	
456 57M-95-05X	#	221.54	7 4.65	456	11	0.010	
1		223.84		ç	1	900	
57M-95-08A	=	221.45	65.7	118	II	0.020	7.00
	[226.19	ì	Š		9	
57P-95-01A	=	220.63	2.36	964	11	0.010	
				Average		0.013	
Vertical Gradients				Geo. Mean		0.013	
57P-95-01A	÷	220.63	0	, inclinant		7	Ą
57P-95-01B	ti N	220.92	7 67.0	v.	H	n 750.0	upward
57M-95-04A	1	221.08	6	7 7	i		
57M-95-04B	II	221.09	0.01	10.4	II.	n 100.0	upwara
57M-95-08A	*	221.45		v -	I	7000	Pa Cinture
57M-95-08B	. 31	221.35	1.0	C:C1	I		OWIIWAITU
Notes: *		Distance seperating middle of well screens mean sea level					



Distance between wells	Jamary 15,1997 Water Eleration (msl)			i		Horizontal Gradieni	
	226.71	uo c	_ `	Dist	11	- 33	
456 It 57M-95-05X	222.82	3.89	_	436	II	6000	
1	224.15	6	,	0	1		
57M-95-08A	221.67	2.48	,	811	II	0.021	
1	226.71		~		1		
57P-95-01A	220.71	6	_	904	11	0.011	
				Average		0.013	
Vertical Gradients			<u> </u>	Geo. Mean Median		0.012	
57P-95-01A	220.71	1] .			7	,
9 ft*	221.06	0.35	_	9	11	0.039 upward	ard
57M-95-04A	221.25	6		,			Ţ
16.4 II*	221.27	70.0	_	10.4	11	o.voi upwara	
57M-95-08A	221.67	ō	`	٠ ۲	ı	0 00¢ dom	Jonnana
57M-95-08B	221.57	1.0	-	C	1		
Notes: *: Dis	Distance seperating middle of well screens mean sea level	well screens					





Distance between wells	Water Elevation (msl)					Gradient
		δħ	/	Dist	11	• #
X60-96-WLS	225.97					
226 ft		4.88	\	226	II	0.022
57M-96-11X	221.09					
X60-96-MZ	225.97					
180 ft	223.48	2.49	_	180	II	0.014
	224.88	1	•	1		\ •
105 ft 105 ft 57M-96-11X	221.09	3.79	_	S 01	11	0.036
	7		L	Average		0.024
			<u> </u>	Geo. Mean		0.022
Notes: msl mean:	mean sea level			Median		0.022

June0297 Area 3

		Horizontal	Gradient	•==		- 0.021283		•		0.013444			= 0.033714		0.022814	0.021288	0.021283
ONS				II		II				11		-	11				
ALCULATI	3			Dist		226				180			105		Average	Geo. Mean	Median
AT C	REA			/		`							_	_			
GRADIE	AOC 57 AREA 3			βħ		4.81				2.42			3.54				
HYDRAULIC GRADIENT CALCULATIONS	1	June 2, 1997	Water Levels		225.82		221.01		225.82		223.4	224.55		221.01			
						# 15				tt C			i fi				
			wells			226				180			105				
			Distance between wells		X60-96-WL5		<i>57</i> M-96-11X		X60-96-WLS		57M-96-12X	57M-95-03X		57M-96-11X			

September 23, 1998 Horizontal				HYL	RAULIC G	RADIENT	CA	HYDRAULIC GRADIENT CALCULATIONS	NS.			
September 23, 1998 Horizontal					A	OC 57 AR	EA 2					
September 23, 1998 Horizontal Horizontal												
Mater Levels Sh				September	23, 1998					Horizonta		
456 ft 6h / Dist = i 456 ft 3.2.74 9h - 456 = 0.007018 118 ft 222.54 - 456 = 0.007018 118 ft 1.85 / 118 = 0.015678 564 ft 225.74 5.07 / 564 = 0.00898 1 m 220.67 0.28 / 9 = 0.015678 1 m 220.67 0.28 / 9 = 0.009963 1 m 220.67 0.28 / 9 = 0.011562 1 m 220.95 0.01 / 9 = 0.011111 1 m 221.19 0.01 / 16.4 = 0.00061 1 m 221.18 0.01 / 16.4 = 0.019355 1 m 221.18 0.03 / 15.5 = 0.019355 1 m 221.35 0.3 / 15.5 = 0.019355 1 m 221.35 0.3 / 15.5 = 0.019355	ince between	ı wells		Water Lev	els					Gradient		
456 ft ft 3.2.74 1.456 = 0.007018 456 ft 222.54 3.2 / 456 = 0.007018 118 ft 223.5 1.85 / 118 = 0.015678 118 ft 225.74 1.85 / 564 = 0.008989 564 ft 225.74 5.07 / 564 = 0.00898 564 ft 220.67 0.28 / 564 = 0.00898 6 220.67 0.28 / 564 = 0.00898 7 220.67 0.28 / 564 = 0.00898 8 220.67 0.28 / 564 = 0.00898 9 ft* 0.28 / 564 = 0.00898 16.4 ft* 220.67 0.28 / 9 = 0.01936 16.4 ft* 221.19 0.01 / 16.4 = 0.00961 16.4 ft* 221.18 0.3 / 15.5 = 0.019355 15.5 ft* 221.35 0.3 / 15.5 = 0.019356 15.5 ft* 0.054 0.3 / 15.5 <						δh	/	Dist	11	•=		
456 ft 3.2 / 456 = 0.007018 1.1 222.54 3.2 / 456 = 0.007018 1.18 223.5 1.85 / 118 = 0.015678 1.18 221.65 1.85 / 118 = 0.015678 1.2 221.65 225.74 225.74 0.00898 = 0.008989 254 ft 220.67 0.28 / 2564 = 0.00898 1.2 1.2 0.067 0.28 / 364 = 0.00898 1.2 1.2 0.067 0.08 0.08 0.00898 0.00898 0.00898 0.00898 0.00898 0.00898 0.00898 0.00898 0.00898 0.00898 0.00898 0.00898 0.00898 0.00898 0.00898 0.00898 0.00898 0.00898 0.00998 0.00998 0.00998 0.00998 0.00998 0.00998 0.00998 0.00998 0.00998 <	M-92-02X			225.74								
1.85						3.2	_	456	li	0.007018		
118 ft	Л-95-05X			222.54								
118 ft 1.85 / 118 = 0.015678 118 ft 221.65 1.85 / 118 = 0.015678 564 ft 225.74 5.07 / 564 = 0.08989 564 ft 220.67 5.07 / 564 = 0.08989 6 220.67 6 <td< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></td<>												
118 ft ft 1.85 / 118 = 0.015678 564 ft 225.74 5.07 / 564 = 0.008989 564 ft 220.67 Average 0.010562 6 220.67 0.28 / 9 0.009963 7 220.67 0.28 / 9 0.008989 9 ft* 0.20.67 0.28 / 9 0.008989 16.4 ft* 220.67 0.01 0.01 / 16.4 0.004111 16.4 ft* 221.19 0.01 / 16.4 0.0061 15.5 ft* 221.18 0.01 / 16.4 0.0061 15.5 ft* 221.35 0.3 / 15.5 0.019355 15.5 ft* 0.3 0.3 / 15.5 0.019355 15.5 ft* 0.3 0.3 / 0.019355 0.019355	Х90-56-Р			223.5								
564 ft 225.74 6.008989 564 ft 225.74 6.008989 564 ft 220.67 7 564 = 0.008989 6 220.67 mean 0.00963 7 ft median 0.008989 9 ft median 0.008989 9 ft 0.28 / 9 = 0.01111 16.4 ft 0.01 / 16.4 = 0.0061 16.4 ft 0.01 / 16.4 = 0.0061 16.5 ft 0.01 / 16.4 = 0.0061 16.5 median 0.01 / 16.4 = 0.0061 16.4 median 0.01 / 16.4 = 0.0061 16.5 median 0.01 / 16.4 = 0.0061 16.4 median median 0.0061 0.0061 16.5 median median						1.85	/	118	=	0.015678		
564 ft 5.07 / 564 = 0.008989 220.67 4 verage 0.010562 6 Average 0.010562 9 ft* 220.67 0.28 / 9 = 0.001111 16.4 ft* 221.19 0.01 / 16.4 = 0.00061 15.5 ft* 221.65 0.3 / 15.5 = 0.019355 *: Distance seperating middle of well screens Distance seperating middle of well screens	M-95-08A			221.65					_			
564 ft 5.07 / 564 = 0.008989 564 ft 220.67 / 564 = 0.008989 1 220.67 Average 0.010562 2 Co. Mean 0.009963 3 Average 0.010562 4 Co. Mean 0.00983 5 Average 0.00983 6 Co. Mean 0.00898 7 Average 0.00898 8 Co. Mean 0.00898 9 Average 0.00898 16.4 Co. Mean 0.0061 16.4 Co. Mean 0.0		-										
564 ft ft 5.07 / 564 = 0.008989 1 220.67 Average 0.010562 2 Average 0.010562 3 Average 0.010562 4 Average 0.010562 5 Average 0.010562 6 Average 0.010562 7 Average 0.010562 8 Average 0.010562 9 Average 0.010563 16.4 Average 0.011111 16.4 Average 0.011111 16.4 Average 0.011111 16.4 Average 0.01111 16.4 Average 0.01111 16.4 Average 0.01111 16.4 Average 0.01111 16.4 Average 0.011355 17.5 Average Average 18.5 Average 0.011355 18.5 Average 0.019355 18.5 <td< td=""><td>M-92-02X</td><td></td><td></td><td>225.74</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></td<>	M-92-02X			225.74								
1.00 1.00						5.07	/	564	li	0.008989		
Average 0.010562 CGo. Mean 0.009963 CGo. Mean 0.008989 P-95-01A			220.67									
Average Average 0.010562 6 Geo. Mean 0.008989 9 ft* 0.28 / 9 = 0.008989 16.4 ft* 0.28 / 9 = 0.01111 16.4 ft* 0.01 / 16.4 = 0.0061 16.4 ft* 0.01 / 16.4 = 0.00061 15.5 ft* 0.03 / 15.5 = 0.019355 15.5 ft* 0.013 / 15.5 = 0.019355 15.5 Distance seperating middle of well screens 0.010 stantage 0.010 stant												
Care Care								Average		0.010562		
9 ft* 220.67 0.28 // 9 = 0.031111 9 ft* 0.20.95 0.28 / 9 = 0.031111 16.4 ft* 221.19 0.01 / 16.4 = 0.00061 16.4 ft* 221.18 0.01 / 16.4 = 0.00061 15.5 ft* 221.65 0.3 / 15.5 0.019355 15.5 ft* 221.35 0.3 / 15.5 0.019355 *: Distance seperating middle of well screens 15.5 15.5 15.5 15.5	cal Gradien	ıts						Geo. Mean		0.009963		
9 ft* 0.28 / 9 = 0.031111 10 ft* 0.28 / 9 = 0.031111 10 ft* 0.28 / 9 = 0.031111 10 ft* 0.09 0.28 / 9 = 0.031111 10 ft* 0.01 / 16.4 0.0061 15 ft* 0.01 / 16.5 0.0061 15 ft* 0.01 / 16.5 0.019355								Median		0.008989		
9 ft* 0.28 / 9 = 0.031111 10.4 221.19 0.01 / 16.4 = 0.00061 16.4 221.18 0.01 / 16.4 = 0.00061 15.5 ft* 221.65 0.3 / 15.5 = 0.01935 15.5 ft* 221.35 0.3 / 15.5 = 0.01935 *: Distance seperating middle of well screens 1 15.5 = 0.01935	2-95-01A			220.67								
16.4 ft* 221.19 0.01			*1			0.28	_	6	11	0.031111	upward	
16.4 ft* 0.01 / 16.4 = 0.0061 16.4 ft* 221.18 0.01 / 16.4 = 0.0061 15.5 ft* 221.65 0.3 / 15.5 = 0.019355 15.5 ft* 221.35 0.3 / 15.5 = 0.019355 *: Distance seperating middle of well screens	P-95-01B			220.95					_			
16.4 ft* 0.01 / 16.4 = 0.00061 221.18 0.01 / 16.4 = 0.00061 221.18 0.01 / 16.4 = 0.00061 15.5 ft* 221.65 221.35 0.3 / 15.5 = 0.019355 *: Distance seperating middle of well screens	4 10 2 0 1			221 10					_			
221.18 221.65 0.3 / 15.5 0.019355 15.5 221.35	A+0.02-1/		*	/1:177		0.01		16.4	11	0.00061	downward	
15.5 ft* 221.65 0.3 / 15.5 = 0.019355	A-95-04B			221.18								
15.5 ft*	100 30 3			37 100								
*: Distance seperating middle of well screens	W00-C2-1	\neg	*	CO:177		0.3		15.5	11	0.010355		
*	000 30 3	\neg		25 100		2		2		200		
*	000-C4-IA			441.33					_			
_	Notes:	*		e seperating mi	ddle of well	screens			<u> </u>			



		Horizontal	Gradient			= 0.01469			= 0.008222			= 0.029429			0.017447	0.015261	0.01469
HYDRAULIC GRADIENT CALCULATIONS	3			Dist		226			180			105			Average	Geo. Mean	Median
GRADIENT C	AOC 57 AREA 3			/ ys		3.32			1.48			3.09		-			
HYDRAULIC (A	September 23, 1998	Water Levels		224.54		221.22	224.54		223.06	224.31		221.22				
			1 wells			226 ft			180 ft			105 ft					
			Distance between wells		X60-96-WLS		57M-96-11X	X60-96-WLS		57M-96-12X	S7M-95-03X		S7M-96-11X				

WELL DEVELOPMENT RECORDS

Harding Lawson Associates

	EVELOPMENT I	RECORD		
Project: T. Diven) Client: USAEC	Well Installation Date:	09/22/93		Project No. 09144-0
Client: USAELO	Well Development Date	e: 10/4/95	Developed by M. Lounsbury	Checked by:
Weil/Site I.D.: 57m-91-0/y	Weather: Rain,	6500	Start Date:	Finish Date:
Well Construction Record Data: Bottom of Screen 2 0 ft.	Well Dia	L	Start Time:	Finish Time:
Sediment Sump/Plug NA ft.	iurface 🛭 Fro	m top of Riser		
Screen Length 10 ft.	Fluids Lost During D	orilling N/A gal.	Enu	
Protective Casing Stick-up [2.10 ft.] Protective Casi	ing/Well Diff. 一の.) u	ft. PID Readin	·	
Water Louisia	0-1		Well Mouth	ppm ppm
Water Levels: 24.6/ft.		iment: opth Before Developma	ent 3. 01 ft	(from top
End of Development 2-1.62ft.		pth After Developmen	20.3.	of PVC)
24 Hrs. After Development	os all	nt Depth Removed	O ft.	
HT of Water Column (4.2 ft. x 1.68°	= [j\g;	al/vol. *For 4	* HSA installed	
34		wells		
Equipment: Dedicated Submersible Pump	Approximate Rech	arge Rate	gpm	
☐ Surge Block	Total Gallons Rem	soved S5	gal.	•
☐ Bailer ☐ 2* ☐ ☐ Grundfos Pump 2* 4*				yes no
Well Development Criteria Met:		Well water clear to	unaided eye	^a □
Notes: Well recharges Fine		 Sediment thickness is <1.0% of screen 		p =
		Total water remove of 5x calculated we 5x drilling fluid lost		9 0
yes End of Well Development Sample (1 pint) Collected?	no	-	•	
Water Parameter Measurments				
Record at the start, twice during and at the end of develop	ment (minimum):			
Time Volume Total Gallons pH	Temp. 13.0	Conductivity	Turbidity F	Pumping Rate
$\frac{1}{2}$ $\frac{7}{10}$ $\frac{312}{5.3}$		-111	1/4	1 Sipm
3 50 2.0		-119	3/	1,
4 30 5.0		:129	37	i,
5 40 5,0	13,0	131	90	
e e e	er i va			
	·			
Well Developed Signature				-
Well Developer's Signature			Environmental Se	anvices Inc.—
		-400	vii oriittetikai oe	,, +1000, 1110.T

WELL D	EVELOPMENT RECORD		
Project: Pt. Devens	Well Installation Date: 09/29/95	12	Project No. 0 9144-02
Project: Pt. Devens Client: USAEC GO Well/Site 1 D: F > 1	Well Development Date:	Developed by:	Checked by:
Well/Site 1.D.: 57 M - 95 - O24	Weather: Rain 600	Start Date:	Finish Date:
Well Construction Record Data: Bottom of Screen 74 ft.	Well Diameter 4 in.	Start Time:	Finish Time: G 30
Sediment Sump/Plug N/A ft. From Ground	Surface From top of Riser		
Screen Length 10 ft.	Fluids Lost During Drilling gal.		
Protective Casing Stick-up 3,80 ft. Protective Cas	sing/Well Diff0.50ft. PID Readin	gs: Ambient Ai	
Water Levels:	Sediment:	AAGII MOOTII	ppm
Initial 19.00ft.	Well Depth Before Developme	int 27.0 ft.	(from top
End of Development 19,19 ft.	Well Depth After Development	27.0 ft.	of PVC)
24 Hrs. After Development 19.01 ft.	Sediment Depth Removed	C ft.	
HT of Water Column	*For 4* wells	HSA installed	
Equipment:	Approximate Recharge Rate		
Dedicated Submersible Pump Surge Block	Total Gallons Removed	gal.	
☐ Bailer ☐ 2" ☐	<u></u>		
☐ Grundfos Pump 2* 4* Well Development Criteria Met:	• Well water clear to u	unaided eye	yes no ⊈ □
Notes: for Will recharge gold, jump	www an • Sediment thickness		á 🗆
hotion-	is <1.0% of screen le	•	
	Total water removed of 5x calculated well 5x drilling fluid lost		<i>p</i> ₽ □
yes End of Well Development Sample (1 pint) Collected	no		
Water Parameter Measurments			
Record at the start, twice during and at the end of develop	oment (minimum):		
Time Volume Total Gallons pH		Turbidity P	Pumping Rate
$\frac{13}{6}$	179 .289	133	1/
<u> </u>	3 13.8 1271	11-	٤,
$\frac{\zeta}{\zeta} = \frac{\zeta_1}{\zeta_2} = \frac{\zeta_1 g_1}{\zeta_2} = \frac{\zeta_1 g_2}{\zeta_2}$	13.8 -13.5		
5 32 3.8	<u> </u>		
this not por			
Mall har)/		_
Well Developer's Signature	ABB F	nvironmental Se	rvices, Inc.

WELLD	EVELOPMENT RECORD	gargaga kantanipatan kantan ya maya san sana ara sa sa	st itsie zwe v een gewied dit higtorile zijn
Project: H. Devens	Well installation Date: 10/3/95 (3/m)		Project No. 09144.62
Client: USAEC GOD	Well Development Date:	Developed by:	Checked by:
Well/Site I.D.: 57m_ 95-03×	Weather: Clauchy, 600	Start Date:	Finish Date:
Well Construction Record Data: Bottom of Screen	Well Diameter	Start Time:	Finish Time:
Sediment Sump/Plug N/A ft. Screen Length N/A ft.	Fluids Lost During Drilling N/A gal.		
Protective Casing Stick-up 3.0 ft. Protective Cas	ing/Well Diff0.3 6 ft. PID Readin	gs: Ambient Ai Well Mouth	ppm O ppm
	Well Depth After Development Sediment Depth Removed *For 4* wells		(from top of PVC)
Equipment: A Dedicated Submersible Pump Surge Block Bailer 2" Grundfos Pump 2" 4" Well Development Criteria Met:	Approximate Recharge Rate 1/2 5 0	gpm gal. unaided eye	yes no
Notes: recharge + 12 = 12 5pm - 6clor on pure inster- più	Sediment thickness is <1.0% of screen is	ength	
water Lonifai nezed betau	of 5x calculated well 5x drilling fluid lost		
yes End of Well Development Sample (1 pint) Collected?	no		
Water Parameter Measurments			
Record at the start, twice during and at the end of developments of the end of	Temp. Conductivity	Turbidity P	umping Rate
1300 3 RU 5.81 811 L/ 30 5.50 915 5 40 5.73	6 12,6 ,232	186 37	1, 7
1032 6 50 5 CT	12.7 .118	22 -	//
Well Developer's Signature MWH. W	·		-
	A88 E	nvironmental Se	rvices, Inc

9312005S L 6

Well/Site I.D.: 57 M- 9504 A Well Construction Record Data: Bottom of Screen Sediment Sump/Plug Well Construction Record Data: 12.4 ft. From Ground Surface 12.4 ft. 14.5	Well Diameter	970	Project No. OGIYY (1) Checked by: Finish Date: LG/LG/Y Finish Time: LG/Y CHECKED NO.
Well/Site I.D.: 57 M- 950 4 Weather: Well Construction Record Data: Bottom of Screen Sediment Sump/Plug Screen Length Protective Casing Stick-up Vater Levels: Weather: Weather: Weather: Weather: From Ground Surface Fluids Protective Casing/Well D	Sum 7 60° Well Diameter 7 in. From top of Riser 1 Lost During Drilling 9al.	Start Date: Luly 95~ Start Time: 930	Finish Date:
Vell Construction Record Data: Bottom of Screen Sediment Sump/Plug Screen Length Protective Casing Stick-up Vater Levels:	Well Diameter	Start Date: luly 95~	Finish Time:
Sediment Sump/Plug Screen Length Protective Casing Stick-up 12.4t.	From top of Riser Lost During Drilling gal.	970	
Protective Casing Stick-up 7.3 ft. Protective Casing/Well D		<u> </u>	
ater Levels:	iff 0. 7ctt. PID Read	lings: Ambient	
		Well Mout	
End of Development 3.3 / ft. 24 Hrs. After Development 3,35 ft. HT of Water Column 10 ft. x 1.68	Sediment: Well Depth Before Developme Well Depth After Developme Sediment Depth Removed #For wells	int 12.86 ft04 ft.	of PVC)
Dedicated Submersible Pump Surge Block Total Bailer 2° 4° Grundfos Pump 2° 4° /ell Development Criteria Met:	• Well water clear to	o unaided eye	yes no
Soll found In Hole yes no	is <1.0% of screen • Total water remov of 5x calculated w 5x drilling fluid los	red = a minimum ell volume plus	(F 0
nd of Well Development Sample (1 pint) Collected?			
/ater Parameter Measurments ecord at the start, twice during and at the end of development (min Time Volume Total Gallons 1 567 5.67	Temp. Conductivity (iii) 278 13-5 1123	742	Pumping Rate
\frac{\sqrt{5.37}}{\sqrt{5.20}}	(3.6 .093 (3.6 .087	48 18	1;
5.19	137 137	13	

WELL	DEVELOPMENT	RECORD			
Project:	Well Installation Date:		\sim	Project I	
ft. Devens		10/3/95 (9)	n)	9144.	
Client: USAEC GM)	Well Development Da		Developed by:	Checker	d by:
Well/Site I.D.: 57m-950007B	Weather: Same	Cro	Start Date:	Finish D	1
Well Construction Record Data:	Well Di	ameter 4 in.	Start Time:	Finish 7	me:
	nd Surface 🗹 💮 Fro	om top of Riser		1000	
Screen Length Screen Length Screen Length	Fluids Lost During [Orilling - gal.			
Protective Casing Stick-up 2, 44 ft. Protective C	Casing/Well Diff0.16	ft. PID Readin	gs: Ambient A	ir (i) p	pm
	<u> </u>		Well Mouth	ပြ	pm
Water Laveis: トレック ft.		liment:			
End of Development		epth Before Developme		(from top of PVC	' 1
24 Hrs. After Development 4.10 ft.		epith After Developmeni			
` 		ent Depth Removed	4€ § ft.		
HT of Water Column 27 ft. X 1.	= 709	al/vol. *For 4* wells	HSA installed		
Equipment:	Approximate Rech	narge Rate 17	gpm		
Dedicated Submersible Pump Surge Block	Total Gallons Ren		gai.		
☐ Bailer ☐ 2* ☐		000			
☐ Grundfos Pump 2* 4* Well Development Criteria Met:	_	Well water clear to a	unaided eye	yes	no 🗆
Notes: Well recharges extre	rely well	• Sediment thickness is <1.0% of screen I		A	
		Total water removed	d = a minimum	立	
		of 5x calculated well 5x drilling fluid lost	volume plus	y	
•	es no				
End of Well Development Sample (1 pint) Collected?			*		
Water Parameter Measuments					
Record at the start, twice during and at the end of dever- Time Volume Total Gallons	elopment (minimum); pH Temp.	Conductivity	Turbidity P	umping F	Rate
1170 1 1 5	1.63 129	331	860 2	G	Pa
$\frac{1}{3} \frac{70}{80} \frac{1}{3}$	59 ld. (7)	1235	73 -	<i>()</i>	- 1
$\frac{3}{4} \frac{3}{120} \frac{3}{5}$	11 124	1933	<u></u>	n	-
<u> </u>	44 124	1237	6	il	
1230 6 200 5.	48 12-8	. 7.31	0	21	
Well Developer's Signature	lang.			-	
		ABB E	nvironmental Se	rvices. Ir	nc.

WELL DEVELOPMENT RECORD				
Project: Ft. Wevens	Well Installation Date:	10/3/95	(MM)	Project No.
Client: USAEC GW	Well Development Da	te: lolldgi-	Developed by:	Checked by:
Vell/Site I.D.: 57m-95-05X	Weather: Sunn	x - 650	Start Date:	Finish Date:
Well Construction Record Data: Bottom of Screen Sediment Sump/Plug Screen Length Data: The property of the construction of the construction Record Data: The property of the construction Record Data: The pro	,	ameter / in. om top of Riser Drilling gal.	Start Time:	Finish Time:
Protective Casing Stick-up 3./o ft. Protective C	Casing/Well Diff0,50	ft. PID Readin	ngs: Ambient A Well Mouth	
Vater Levels: Initial End of Development 15,79ft. 24 Hrs. After Development HT of Water Column C ft. x 1.6	Well De Well De Sedime	epth Before Development After Development Depth Removed	72, 10	(from top of PVC)
Equipment: Dedicated Submersible Pump Surge Block Bailer 2* 4* Grundfos Pump 2* 4* Well Development Criteria Met:	Approximate Rech		gpm gal. unaided eye	yes no∣ ØÀ □
Notes: Uz Little Sand / Sout Din	well	Sediment thickness is <1.0% of screen	remaing in well	<i>a</i> 0
		Total water remove of 5x calculated wei 5x drilling fluid lost		
ye End of Well Development Sample (1 pint) Collected?	es no D			
Nater Parameter Measurments			•	
$\frac{15/6}{2} \frac{1}{10} \frac{1}{8}$	pH Temp. 1,40 1,46 1,05 1,17,0 1,17,0 1,17,0 1,17,1	Conductivity	Turbidity Over 1 10 1 24	Pumping Rate O 6 pm
Vell Developer's Signature Mind H. Jonny	/	AB8 F	invironmental Se	ervices, Inc.

	WELL D	EVELOPMENT RE	CORD		
Well Construction Record Gata: Well Construction Record Gata: Well Construction Record Gata: Well Construction Record Gata: Sadiment Sump Plug Screen Length From Ground Surface From top of Riser From Ground Surface From top of Riser From top of Riser From Ground Surface From top of Riser From top of Riser From Ground Surface From top of Riser From top of Riser From top of Riser From Ground Surface From top of Riser From Ground Surface From top of Riser From top of Riser From Ground Surface From top of Riser From top of Riser From Ground Surface From top of Riser From top of Riser From Ground Surface From top of Riser From top of Riser From Ground Surface From Ground Surface From top of Riser From Ground File Riser From Ground	Project: Ft. Caupas	Well Installation Date:	10/4/95 2	5	Project No.
Well Construction Record Data: Bottom of Screen Sediment SumpiPlus Screen Length From Cround Surface From top of Riser		Well Development Date:	0/4/45		{
Well Diameter	Well/Site I.D.: 5)m-95-06x	<u> </u>		Start Date:	
Sediment SumpPlug Screen Length From top of Riser Well Depth Before Development From top of PVC) Well Depth Before Development From top of Riser Well Depth Before Development From top of Riser Well Depth Before Development From top of Riser Well Depth Before Development From top of Riser Well Depth Before Development From top of Riser Well Depth Before Development From top of Riser Well Depth Before Development From top of Riser Well Depth Before Development From top of Riser Well Depth Before Development From top of Riser Well Depth Before Development From top of Riser Well Depth Before Development From top of Riser From top of Riser Well Depth Before Development From top of Riser From top of Ris	The state of the s		ter 1 in.	Start Time:	Finish Time:
Protective Casing Stok-up 2.13 ft. Protective Casing/Well Diff. O.16 ft. PID Readings: Ambient Air Oppm Water Levels: Initial 1/03 ft. 21/17 Sediment: Well Development 3.3 g.2.ft. (from top of PVC) Water Levels: Initial 1/03 ft. 21/17 Sediment: Well Depth Before Development 3.3 g.2.ft. (from top of PVC) Well Depth After Development 3.3 g.2.ft. (from top of PVC) Well Depth After Development 3.3 g.2.ft. (from top of PVC) Well Depth After Development 3.3 g.2.ft. (from top of PVC) Well Depth After Development 3.3 g.2.ft. (from top of PVC) Well Development Total Callons Pemp 1.5 g.2 g.2.ft. (from top of PVC) Well Development Total Submersible Pump 1.5 g.2 g.2 g.2 g.2 g.2 g.2 g.2 g.2 g.2 g.2	From Ground	Surface From to	op of Riser 🔲		
Well Mouth	Screen Length 10 it.	Fluids Lost During Drillin	ig al.		
Water Leveis: Initial I 1/03 ft. 2/1, 17 Sediment: Well Development I 1/03 ft. 2/1, 17 Sediment: Well Development I 1/03 ft. 2/1, 17 Well Depth Sefore Development I 2/33 2 ft. (from top of PVC) HT of Water Column	Protective Casing Stick-up 2.13 ft. Protective Cas	sing/Well Diff0./6 ft.	PID Readir	ngs: Ambient	Air ppm
Initial End of Development 24 Hrs. After Development Well Depth After Development 15.11 h. Sediment Depth Removed For 4* HSA installed wells Equipment: Sediment Depth Removed For 4* HSA installed wells Equipment: Sediment Depth Removed For 4* HSA installed wells Sequipment: Sediment Depth Removed For 4* HSA installed wells Sequipment: Sediment Depth Removed For 4* HSA installed wells Sequipment: Sediment Depth Removed For 4* HSA installed wells Sequipment: Sediment Depth Removed For 4* HSA installed wells Sequipment: Sediment Depth Removed For 4* HSA installed wells Sequipment: Sediment Depth Removed For 4* HSA installed wells Sequipment: Sediment Depth Removed For 4* HSA installed wells Sequipment: Sediment Depth Removed For 4* HSA installed wells Sequipment: Sediment Depth Removed For 4* HSA installed wells Sediment Depth Removed For 4* HSA installed wells Sediment Depth Removed For 4* HSA installed wells Sediment Depth Removed For 4* HSA installed wells Sediment Depth Removed For 4* HSA installed wells Sediment Depth Removed For 4* HSA installed wells Sediment Depth Removed For 4* HSA installed wells Sediment Depth Removed For 4* HSA installed wells Sediment Depth Removed For 4* HSA installed wells Sediment Depth Removed For 4* HSA installed wells Sediment Depth Removed For 4* HSA installed wells Sediment Depth Removed For 4* HSA installed wells Sediment Depth Removed For 4* HSA installed wells Sediment Depth Removed For 4* HSA installed wells Sediment Depth Removed For 4* HSA installed wells Sediment Depth Removed For 4* HSA installed wells Sediment Depth Removed For 4* HSA installed wells For 4* HSA installed wells For 4* HSA installed wells Sediment Depth Removed For 4* HSA installed wells Sediment Depth Removed For 4* HSA installed wells For 4* HSA installed wells For 4* HSA installed wells For 4* HSA installed wells For 4* HSA installed wells For 4* HSA installed wells For 4* HSA installed wells For 4* HSA installed wells Fo				Well Mout	h O ppm
Surge Block Bailer 2°	End of Development 24 Hrs. After Development 77.03 ft. 17.03 ft.	Well Depth Well Depth Sediment D	After Development epth Removed ol. *For 4	a 4,77 tt.	(from top of PVC)
Total water removed = a minimum of 5x calculated well volume plus 5x drilling fluid lost Total water removed = a minimum of 5x calculated well volume plus 5x drilling fluid lost Total Gallons Total Gallons PH Temp. Conductivity Turbidity Pumping Rate Total Gallons Total Gallons PH Temp. Conductivity Turbidity Pumping Rate Total Gallons Total Gallon	☐ Dedicated Submersible Pump☐ Surge Block☐ Bailer☐ 2°☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐	Total Gallons Removed	d 80	gal. unaided eye	b a
Water Parameter Measurments Record at the start, twice during and at the end of development (minimum): Time Volume Total Gallons pH Temp. Conductivity Turbidity Pumping Rate 7 Y D	Notes.	• T	<1.0% of screen otal water remove	length ed = a minimum	
Record at the start, twice during and at the end of development (minimum): Time Volume Total Gallons pH Temp. Conductivity Turbidity Pumping Rate 7 10	·	5x		·.	
Time Volume Total Gallons pH Temp. Conductivity Turbidity Pumping Rate 740 1 1 5.42 12.9 .153 — 1.6 50.4 1.6 50	Water Parameter Measurments				
837 3 30 5.50 13.6 106 60 4 837 4 45 5.41 13.8 104 0 4 842 5 60 5.46 13.8 104 0 4 850 6 71 5.41 13.5 164 Well Developer's Signature Mills 3	Time Volume Total Gallons ph	Temp.		Turbidity	10
842 5 60 5.46 13.8 ,104 0 4 8 for note not working property 8 50 6 75 5.41 13,5 164 0 11	813 3 75 5.3	12.3			·
842 5 60 5.46 13.8 ,104 0 4 8 for note not working property 8 50 6 75 5.41 13,5 164 0 11	$\frac{837}{3}$ $\frac{30}{100}$ $\frac{5.10}{5.10}$				
Well Developer's Signature Middle 2					
	& form rute not weren proper				
	Well Developer's Signature		ARR F	Environmental S	envices Inc

WELL DEVELOPMENT RECORD					
Project: Ft. Devens	Well Installation Date:	0/5/95	ap)	Project No. 69144-02	
Client: USAFC (3m)	Well Development Date	Iolixlar	Developed by		
Well/Site I.D.: 57m -95-07x	Weather: Sunny	200 600	Start Date:	Finish Date:	
Well Construction Record Data: Bottom of Screen 13 tt. From Ground	Well Diar	neter in.	Start Time:	Finish Time:	
Sediment Sump/Plug N/A ft. Screen Length Oft.	Fiulds Lost During Dr				
Protective Casing Stick-up , (ft. Protective Cas	sing/Well Diff. 70.33 f	PID Readin	Mell Mout	-	
Water Levels: Initial End of Development 3.6	Weil Dep	th Before Developmenth After Developmenth Depth Removed	ent 17, 33 ft.	(from top of PVC)	
Equipment: Dedicated Submersible Pump Surge Block Bailer 2° Grundfos Pump 2° 4°	Approximate Recha Total Gallons Remo	1.1	gpm gal.	yes no	
Well Development Criteria Met: Notes:		Sediment thickness is <1.0% of screen!	remaing in well	8 0	
		Total water removed of 5x calculated well 5x drilling fluid lost			
yes End of Well Development Sample (1 pint) Collected?	no				
Water Parameter Measurments			•		
Record at the start, twice during and at the end of developments of the start, twice during and at the end of developments of the start, twice during and at the end of developments of the end of the end of developments of the end of the	Temp. 12.7 12.7 12.7 13.0	Conductivity .16/ .159 .153 .110	00°7 200 0	Pumping Rate	
848 6 80 5.4 5.2°	1).8	115/	<u> </u>	12	
Well Developer's Signature Analy 11.	<u> </u>				
	/	AB8 E	nvironmental S	ervices, Inc.	

	Mai	L DEVELOPMEN	IRECORD		
Project:	evens	Well Installation Da	ate:		Project No.
Client:	MGC (F)	Well Development		Developed by:	
Well/Site I.D.: アラ	Att you	Weather: C	101(3/91	Start Date:	Finish Date
3 /,	n-95-08A	Jun	14 70°	10/13/91	10/13/98
Well Construction Re Bottom of Screen	13 ft.	_	Diameter 4 i	Start Time:	Finish Time
Sediment Sump/Plu	rom Grou	und Surface 🕱	From top of Riser	••••• <u>••</u> ••••	
Screen Length	10 n.	Fluids Lost Durin	ng Drilling 🕳 ga	ıl.	
Protective Casing St	ick-up 1.65 ft. Protective	Casing/Well Diff 6.			Air — ppm
		L		Well Mout	h ppm
Water Levels:	[7,5]	<u> </u>	Sediment:		
End of Developme	$\begin{array}{c c} 3,1 & \text{ft.} \\ \hline 12.57 & \text{ft.} \end{array}$	Wel	Depth Before Develor	1, 5. 73	(from top of PVC)
	3 100	Well	Depth After Developn		,
24 Hrs. After Devel	<u> </u>		iment Depth Removed	0.95 ft.	
HT of Water Co		= [<u>/</u>	/gal/vol. *Fo	r 4" HSA installed Is	
Equipment:		Approximate R	echarge Bate 17.		
	Dedicated Submersible Pump Surge Block	p Total Gallons f	//	gpm gal.	
	☐ Bailer ☐ 2* ☐	roun danons		3	
Well Development C	Grundfos Pump 2" 4"		Well water clear	to unaided eve	yes no
		me, had to		ess remaing in well	
rachare befor	Dies after 1st Volce 2 Continued divelo	Oment	is <1.0% of scre		<u>.</u> .
	<i>)</i>			oved = a minimum well volume plus	
		yes no			
End of Well Develop	ment Sample (1 pint) Collected?				
Water Parameter Me	asurments	. **			
	wice during and at the end of dev	velopment (minimum): pH Temp.	Conductivity	Turbidity	Pumping Rate
Time Vo. 920	olume Total Gaillons	5.72 12.6	.102	OVER	16pm
935	2 16 3	13.0	100	158	
1030	3 32 6	13 14.0	.694	101	
1051	·	<u>,89 13.7</u>	1088		
1110	- L	$\frac{13.6}{15.7}$	- 1083	<u> </u>	
1912	6.1			0	
Buttery Vey Low 19: May - Thre S	fung 1-1/2 SPM well till magnet be white	will run ony i Sud Left En	ishen fuzzy in	ngy Emply cr	nimed
Well Developer's Sign	nature 1 W M	γ			-
				B Environmental S	

WELL DEVELOPMENT RECORD					
Project: Ft. Devens	Well Installation Date:	10/10/95 (aju)	Project No.	
Client: USAEC (Six)	Weil Development, Dat	e:	Developed by: M. Lounsby	Checked by:	
Well/Site I.D.: 57M-95-08B	Weather: Sunn Y	700	Start Date: 10/12/91	Finish Date:	
Well Construction Record Data: Bottom of Screen 25 ft.	Well Dia		Start Time: 1358	Finish Time:	
Sediment Sump/Plug N/A ft. From Ground S	3urface- √ Fro	m top of Riser 🔲			
Screen Length 10 ft.	Fluids Lost During D	orilling gal.			
Protective Casing Stick-up 2, 85 ft. Protective Casi	ing/Well Diff0.49	ft. PID Readin	gs: Ambient Ai		
Water Levels:	Sedi	iment:			
Initial 4.00 ft.		pth Before Developme	nt 30,24ft.	(from top	
End of Development 4, 3 2 ft.	Weil De	pth After Development	-3	of PVC)	
24 Hrs. After Development 3.13 ft.	Sedimer	nt Depth Removed	G :18 ft.		
HT of Water Column 26 ft. x 1.68°			HSA installed		
Equipment:					
Dedicated Submersible Pump	Approximate Rech	×	gpm		
Surge Block	Total Gallons Rem	oved 200	gal.		
Grundfos Pump 2* 4*				yes no	
Well Development Criteria Met:	a ir u	Well water clear to u			
Notes: furged 90 sals an Isliz 195	Developer	 Sediment thickness is <1.0% of screen le 		Ø □	
01 10/3/91	CHOE O P NO	Total water removed		2 0	
		of 5x calculated well 5x drilling fluid lost	volume plus		
yes End of Well Development Sample (1 pint) Collected?	no				
Water Parameter Measurments			•		
	·				
Record at the start, twice during and at the end of develop Time Volume Total Gallons pH	Temp.	Conductivity	Turbidity P	umping Rate	
	13.4	<u></u>		,5 6PM	
1630 2 44 6.5		1236	12 -		
700 -3 -33 4,5		1, 183	-15		
525 5 176 5.69	8 11.6	125/	6		
854 6 270 5,11	11,4	.240	0)	
Wall Davalagara Signatura Mind H. him	7				
Well Developer's Signature	7	ABB Fr	nvironmental Se	rvices Inc	

WELL DEVELOPMENT RECORD					
Project: FT DEVENS	Well Installation Date:		Project No. 9144 08		
Client: USACE	Well Development Date:	Developed by:	Checked by:		
Well/Site I.D.: M (MC) - 91C - C9 X	Weather:	Start Date:	Finish Date:		
Well Construction Record Data:	Well Diameter in.	Start Time:	Finish Time:		
Bottom of Screen 7tt. From Ground S	Surface From top of Riser	1770	1734		
Sediment Sump/Plug 23 0 ft. Screen Length 10 ft.	Fluids Lost During Drilling				
	ing/Well Diff. O.C.; ft. PID Readin	ngs: Ambient A	Ø ⊘ ppm		
		Well Mouth	≥ Ø ppm		
Water Levels: Initial End of Development FOTE	Sediment: Well Depth Before Developmen Well Depth After Developmen	G-57-5	(from top of PVC)		
24 Hrs. After Development ft.	Sediment Depth Removed	0.23 ft.			
HT of Water Column 7. 니스 ft. X 다. 1.68*	= gal./vol. 7 For 4* wells	HSA installed			
Equipment: Dedicated Submersible Pump Surge Block Bailer 2" Grundfos Pump 2" 4" Well Development Criteria Met: Notes: yes End of Well Development Sample (1 pint) Collected?	Approximate Recharge Rate Total Gallons Removed • Well water clear to • Sediment thickness is <1.0% of screen is • Total water remove of 5x calculated well 5x drilling fluid lost	remaing in well itength	yes no		
Water Parameter Measurments					
Record at the start, twice during and at the end of development of the start, twice during and at the end of development of the start, twice during and at the end of development of the start, twice during and at the end of development of the start, twice during and at the end of development of the end of the en	Temp. Conductivity 136 42 128 42 126 42 127 42	Turbidity & F GC 230 5 251 Ø U89 © 302 Ø 314	/. 5 /. 5 /. 5 /. 5		
Well Developer's Signature	PROJEC FORT DEVEN	/ELOPMENT T OPERATIO IS, MASSACI nvironmental Se	NS PLAN HUSETTS		

WELL DEVELOPMENT RECORD					
Project: FT DEVEUS	Well Installation Date:		Project No. 9144.08		
Client: USACE	Well Development Date: 09/11/44	Developed by:	Checked by:		
Well/Site I.D.: 57M-96-10X	Weather: Claudy	Start Date:	Finish Date:		
Well Construction Record Data:	Well Diameter 3 in.	Start Time:	<i>C9/11/F11</i> Finish Time:		
, , , , , , -	Surface From top of Riser		1344		
Sediment Sump/Plug 13 ft. Screen Length 10 ft.	Fluids Lost During Drilling O gal.	,			
	ing/Well Diff. C. 2 ft. PID Reading	ngs: Ambient Ai	To so ppm		
			1.4 ppm		
Water Levels: nitial 7.55 ft.	Sediment: Well Depth Before Developm	15.50 ent 15.45°R	/6		
End of Development 13 22 ft.	Well Depth After Developmen		(from top of PVC)		
24 Hrs. After Development ft.	Sediment Depth Removed	C tt.			
HT of Water Column S.1 ≥ tt. × 1.68°	= gal/vol. 7 *For 4 wells	* HSA installed			
Equipment:	Approximate Recharge Rate 0.1	gpm			
✓ Dedicated Submersible Pump ☐ Surge Block	Total Gallons Removed	gal.			
☐ Bailer ☐ 2* ☐ ☐ Grundfos Pump 2* 4*			yes no		
Well Development Criteria Met:	Well water clear to	unaided eye			
Notes: WELL GOILE TRY AFTER-59	• Sediment thickness is <1.0% of screen		Ø 0		
	Total water remove of 5x calculated we 5x drilling fluid lost	\ 1			
yes End of Well Development Sample (1 pint) Collected?	_ no				
Water Parameter Measurments	en de la composition de la composition de la composition de la composition de la composition de la composition La composition de la composition della compos	<u>.</u>			
Record at the start, twice during and at the end of develop		- 12			
Time Volume Total Gallons PH CRCC 7 qcl 7 qcl 558		Turbidity S P	umping Rate		
1C10 17 and 14 and 56		503 314			
1740 7 Gal 21 gal 5.75		707 161			
1315 17501 38 act 554	1 121 33	591 177			
1345 7gel 35 gel 554	116 32	1443 108			
Can.		VELOPMENT			
Well Developer's Signature	FORT DEVEN	NS, MASSACH	IUSETTS		

WELL DEVELOPMENT RECORD					
Project: FT DEVELLS	Well Installation Date:	8 30 94		Project No.	
Client: USACE	Well Development Dat		Developed by: C. LaCoqt	Checked by:	
Well/Site I.D.: 57 M · 9U - 11 X	Weather:	57	Start Date:	Finish Date:	
Well Construction Record Data:	Well Dia	ameter 2 in.	Start Time:	Finish Time:	
Bottom of Screen 12 ft. From Ground		L	1140	1550	
Sediment Sump/Plug /2 ft.	Sunace 2 Fro	om top of Riser			
Screen Length /O ft.	Fluids Lost During D				
Protective Casing Stick-up Protective Cas	sing/Well Diff. 5.54	ft. PID Readin		ir OCppm	
			Well Mouth	0.5 ppm	
Water Levels: Initial 3 C Y ft.		liment:			
	Well De	pth Before Developme	14.33	(from top of PVC)	
	Well De	pth After Developmen	1459#	3 (1 4 3)	
24 Hrs. After Developmentft.	Sedime	nt Depth Removed	Ø ft.		
HT of Water Column 10,91 ft. x □ 1.68	= g:	al/vol. 10 *For 4*	HSA installed		
<u> </u>	_	wells	······································		
Equipment:	Approximate Rech	arge Rate 0.17	gpm		
☑ Dedicated Submersible Pump ☐ Surge Block	Total Gallons Rem	}	gal.		
☐ Bailer ☐ 2" ☐		<u> </u>			
☐ Grundfos Pump 2" 4"		- Mall water clear to	ramaialo el arra	yes no	
Well Development Criteria Met:		Well water clear to a	·		
Notes: WELL DRY AFTER 5 gal		 Sediment thickness is <1.0% of screen i 			
		Total water removed			
		of 5x calculated well 5x drilling fluid lost	I volume plus N	7	
yes	no	•			
End of Well Development Sample (1 pint) Collected?					
Water Parameter Measurments			R		
Record at the start, twice during and at the end of develop	·		Turbidity & P		
Time Volume Total Gallons pH	•	Conductivity	(5.5.5.5)	Pumping Rate	
1250 10 gal 10gal 59		<u>102</u> 99	>1CCC 56 _		
1358 10aci 30aci 5.9	$\frac{13.6}{12.4}$	106	497 90 -		
1450 10aci 30aci 37		98	408 18		
1550 10 act 50 oct 5.81	12.5	103	175 60		
			Ŧ		
		WELLDE	/ELOPMENT	מרטטט	
Wall Davidson Comments of the		PROJEC	T OPERATIO	NS PLAN	
Well Developer's Signature		FORT DEVEN	IS, MASSACI Invironmental Se		
		ADO E	ec isinemmonivii.	JI VICES, INC.	

WELL DEVELOPMENT RECORD					
Project: FORT DEVENIS	Well Installation Date: SY 29 / 9 4		Project No. 9144.08		
Client:	Weil Development Date:	Developed by:	Checked by:		
USACE	09/11/4u	Chicy	255		
Well/Site I.D.: 57m - 910 - 12x	Weather: CUEIZCAST	Start Date:	Finish Date: 59/11/90		
Weil Construction Record Data:	Well Diameter 2	in. Start Time:	Finish Time:		
Bottom of Screen 13 ft. From Ground	Surface From top of Riser		1641		
Sediment Sump/Plug / 2 ft.		·			
Screen Length / D ft.	Fiuids Lost During Drilling	gal.			
Protective Casing Stick-up 3.05 ft. Protective Cas	ing/Well Diff. C.25 ft. PID F	Readings: Ambient Ai	ir.C. Ø ppm		
		Well Mouth	ූ 5 ppm		
Water Levels:	Sediment:				
Initial 5.35 ft. End of Development 4.12 ft.	Well Depth Before Deve	elopment 15 13 ft.	(from top of PVC)		
	Well Depth After Develo	ppment 15,13 ft.	,		
24 Hrs. After Development ft.	Sediment Depth Remov	red 😕 ft.			
HT of Water Column G.78 ft. × □ 1.68	= gal/vol. 4	For 4" HSA installed wells			
Equipment:	Approximate Recharge Rate	25			
Dedicated Submersible Pump	Total Gallons Removed 41	375 gpm 5 gal.			
☐ Surge Block ☐ Bailer ☐ 2* ☐	Total Gallons hemoved	7 2			
☐ Bailer ☐ 2* ☐ ☐ Grundfos Pump 2* 4*	***		yes no		
Well Development Criteria Met:		ear to unaided eye			
Notes:	• Sediment thic is <1.0% of so	kness remaing in well creen length			
	• Total water re	moved = a minimum N	300		
		ed well volume plus	<i>y</i> = -		
yes	√ no	, , , , , , , , , , , , , , , , , , , ,			
End of Well Development Sample (1 pint) Collected?					
Water Parameter Measurments		151	İ		
Record at the start, twice during and at the end of develop Time Volume Total Gallons PH	ment (minimum): Temp. Conductivit	y Turbidity S	umping Rate		
Time Volume Total Gallons pH	12.8 5C	3/6/4 70	diliping hate		
1505 9 cal 18 gal 51	1 119 51	F12 122			
15% 9 acid 27 gcl 5.70	9 11.9 51	630 59			
1605 9 gal 3/2 ach 57	102 50	514 74			
11540 9 get 45 get 584	12.5 49	471 208			
	\A/C: 1	DEVELOPMENT	BECODO #		
Wall Davalanare Signatura	PRO	DEVELOPMENT JECT OPERATION	NS PLAN		
Well Developer's Signature		EVENS, MASSACH BB Environmental Sei	1		

WELL DEVELOPMENT RECORD				
Project:	Well Installation Date:			Project No.
FORT DEVENS	08/29/94		l Davidana d b	9144.08
Client: USACE	Well Development Date:		Developed by:	Checked by:
Well/Site I.D.: 57M-96-13X	Weather: CUERCAST		Start Date: C9/19/94	Finish Date:
Well Construction Record Data:	Well Diame	ter 2 in.	Start Time:	Finish Time:
Bottom of Screen t. From Ground	~	p of Riser	0845	0946
Sediment Sump/Plug 13 ft.	Surace M 1 1011 K	p or ruser [
Screen Length IS ft.	Fluids Lost During Drillin	g gal.		
Protective Casing Stick-up 3.62 ft. Protective Cas	ing/Well Diff. Or 37 ft.	PID Readin		r Ø. Ø ppm
			Well Mouth	O. Ø ppm
Water Levels:	Sedime	nt:		
	Well Depth	Before Developme	ent /4 73tt.	(from top of PVC)
End of Development 5 % ft.	- Well Depth	After Developmen	t 14.89th.	01 - 40)
24 Hrs. After Development ft.	Sediment D	epth Removed	0.06 tt.	
HT of Water Column G.7 2 ft. X 1.68	gal./v	ol. 9 *For 4*	' HSA installed	
		weils		
Equipment:	Approximate Recharge	Rate 6.75	gpm	
Dedicated Submersible Pump	Total Gallons Remove	2.75	gai.	
☐ Surge Block ☐ Bailer ☐ 2* ☐	rotal Gallons Remove	40	yai.	
☐ Grundfos Pump 2* 4*				yes no
Well Development Criteria Met:	• V	/ell water clear to	unaided eye	3 0
Notes: SLOCU RECITARGE		ediment thickness <1.0% of screen I		
	• T	ntal water remove	d = a minimum N	
	of	5x calculated well		
yes	no s.	drilling fluid lost		
End of Well Development Sample (1 pint) Collected?	<u> </u>			
Water Parameter Measurments				
Record at the start, twice during and at the end of develop	oment (minimum):		TE	
Time Volume Total Gallons pH		Conductivity	* * *	rumping Rate
0845 <u>9gal</u> <u>9gal</u> 70	<u>v</u> <u>125</u>	<u>80</u>	230 261	
6966 9 gal 18gal 6.18			250 D13_	
C915 9 gai 27 gal 599		49	>1000 1246 49 237	
0930 9 gai 36 gal 599	13.2	48	4 334	
1945 9 gai 45 gal 5.88	<u> </u>			
	•			
			•	ļ
0			/ELOPMENT	
Well Developer's Signature			T OPERATIO IS, MASSACI	
	1		invironmental Se	1

FIELD SAMPLE DATA RECORDS (GROUNDWATER AND 1998 SOILS)

Harding Lawson Associates

ABB ENVIRONMENTAL SERVICES, I	NC.					
FIELD DATA RECORD - GROU	NDWATER	•	FILE TYPE CGW	SITE TYPE	WELL	JOB 9144-02 NUMBER
OJECT USAEC-FT. DEVENS	WEATHER SUNN	4, 40	2	LOCATION STAR	1254	END 1530
SITE ID 57M-95-	OIX SAMPLE NUMBER	MX57	OIXI DATI	E 10-30-95	STUDY A	REA 57
WATER LEVEL / WELL DATA	MEASURED FROM	PID HEAD	SPACE READINGS	WELL INTEGR	ITY	YES NO
WELL DEPTH 29.0 FT	TOP OF WELL (A		G O.O ppm	PROTECTIVE	CASING SECU	RE X
WATER DEPTH 22.31 FT HEIGHT OF	TOP OF CASING	ZONE WELL HEAD	0.0 ppm	WELL LOCKED	PRESENT	
WATER COLUMN 6-7 FT	DIAMETER = 7	PROTECTI	VE		ECTIVE	
x 1.68 gal/ft (4" well) =	= 14 cal GAL/VO	FROM GRO	UND 2.3	ſ	INGE/WELL FERENCE	0,4 FT
PURGE DATA VOLUME A	initial 1 13:02 13:18	13:35	3:57 14:13 14	7:30		SAMPLE OBSERVATION
GALLONS	0 14	28	12 56	70		CLEAR
TEMPERATURE, deg. C	13.8 13.8	13.9 1	3.8 13.8	13.7		TURBID
pH units	6-5 5.6	5.78 5	87 5.80 5	5.87		COLORED
SPECIFIC CONDUCTIVITY, umho/cm	110 101	98 8	31 85 2	84		ODOR
TURBIDITY' ntu	Not measured -					OTHER (SEE NOTES)
REDOX (AT COMPLETION OF PURGIN	1G)-mV 327.9					- (SEE NOTES)
MPLE PARAMETERS COLLECT	ED METHOD # FRA	ACTION CODE	PRESERATIVE	VOLUME	SAMPLE BOT	TLE NUMBER
svocs	UM18	MS	4C	2- 1L AG	A , B	CONTROL #167
PEST./PCBS	UW19	EC	4C	2- 1L AG	C D	
voc 🕅	UM20	VP	HCL,4C	4- 40 ml AG	E , F	
INORGANICS-UNFILTERED	*	N	HN03 pH<2	1- 1L Poly	I	
INORGANICS-FILTERED	*	NF	ниоз рн<2	1- 1L Poly	J	IF MS/MSD
WATER QUALITY PARAM.	*	С	4C	1- 1L Poly	K	COLLECTED
/ TDS (L)	160.1	s	H2SO4 pH<2	1- 1L <u>Pol</u> y	L	IF DUPLICATE COLLECTED
трнс 💆	418.1	С	H2S04 pH<2	1- 11 Poly 2-11 AG	> <u>M</u> +N	
SAMPLING EQUIPMENT	PURGI	NG SAMPLING	ì			MBER OF IN-LINE
WATER LEVEL EQUIPMENT USED:	KI		DEDICATED SUBMIR	SABLE PUMP (WHAL		LTERS USED:
ELECTRIC CONDUCTIVITY PRO	BE		DEDICATED TEFLON	BAILER		
FLOAT ACTIVATED			IN-LINE FILTER (INORGANICS)		
OTHER			OTHER			
Notes: * PAL inorganics: ICP m Water Quality Paramete	rs: PO4 (TF27), TK	N (TF26), NII	21), TL (SD09), SB (TF22), CL/SO4 ((SD28), PB (SD2 TT10), TSS (160.	0), HG (SB0 2), ALK (30	1). 1.0), HARDNESS.
Did not have a	e trubidany n	refer				-
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	_	SAMPI F	S SIGNATURE	rah Morta	mer	1
		Gran GCI				
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ABB ENVIRONMENTAL SERVICES, IN	C.					
FIELD DATA RECORD - GROUN			FILE TYPE CG	SITE TYPE	WELL JOB	9144-02 BER 9144-02
PROJECT USAEC-FT. DEVENS	_	winy, 40s	, , , , , , , , , , , , , , , , , , ,	LOCATION STAR	T 1547_ EN	10 132
SITE 10 57M95	22X FIE SAMP	LE MX57	DEXI DAT	ACTIVITY	STUDY AREA (ÁOC)	1658 57
WATER LEVEL / WELL DATA	MEASURED FROM	PID HEAD	SPACE READINGS	WELL INTEGR	ITY	YES NO
WELL DEPTH 25 FT	TOP OF WELL	(MSer) BREATHIN	IG O -O ppm	PROTECTIVE	CASING SECURE	
WATER DEPTH 16-09 FT	TOP OF CASIN			WELL LOCKED		Ř H
HEIGHT OF WATER COLUMN 829 FT	WELL DIAMETER =	WELL HEAD	0.0 ppm	PVC WELL CA	P PRESENT	
x 1.68 gal/ft (4" well) = gal/ft (well)	15 gal + ≈3 gal	L/VOL CASING S	TICK-UP 28	FT CAS	INGE/WELL FERENCE	2.5 FT
PURGE DATA VOLUME #	15:52 76	03 3/6:12 1	0:31 56:46		SAMPL	E OBSERVATION
GALLONS	18 30	الرسسا	72 90		C	LEAR
TEMPERATURE, deg. C	14.4 14.	5 14.5 1	4.5 14.5			URBID
pH units	6.38 6.3	6 6.38 6	36 6.36		C	OLORED
SPECIFIC CONDUCTIVITY, umho/cm	329 32	3 321 :	315 310		C	DOR
TURBIDITY' ntu	6 3	9	3 3		3 1 1	THER SEE NOTES)
REDOX (AT COMPLETION OF PURGING)-mV 284	1.1			(,	SEE NOTES
•						
SAMPLE PARAMETERS COLLECTE	D METHOD #	FRACTION CODE	PRESERATIVE	VOLUME	SAMPLE BOTTLE	NUMBER
svocs	UM18	MS	4C	2- 1L AG	A B CO	ONTROL # <u>169</u>
PEST./PCBS	UW19	EC	4C	2- 1L AG	C D	
voc	UM20	VP	HCL,4C	4- 40 ml AG	E F	G H
INORGANICS-UNFILTERED	*	N	HN03 pH<2	1- 1L Poly	I	
INORGANICS-FILTERED	*	NF	HN03 pH<2	1- 1L Poly	J	IF MS/MSD COLLECTED
WATER QUALITY PARAM.	* 160.1	С	4C	1- 1L Poly	к	IF DUPLICATE
7 100	100.1	S	H2SO4 pH<2	1- 1L Poly	L	COLLECTED
трнс	418.1	С	H2SO4 pH<2	Z-ILAG	M N	
SAMPLING EQUIPMENT	PU	RGING SAMPLING	ì		NUMBER	OF IN-LINE
WATER LEVEL EQUIPMENT USED:			DEDICATED SUBMIR	SABLE PUMP (WHAL	FILTERS E)	USED:
ELECTRIC CONDUCTIVITY PROB	· ·		DEDICATED TEFLON	BAILER		1
FLOAT ACTIVATED		H	IN-LINE FILTER (INORGANICS)		
OTHER			OTHER			
Notes: * PAL inorganics: ICP me						
Water Quality Parameter	s: PO4 (TF27),	TKN (TF26), NIT	(TF22), CL/S04 (TT10), TSS (160.7	2), ALK (301.0),	HARDNESS.
						-
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ABB ENVIRONMENTAL SERVICES, I	NC.		FILE TYPE CGW	SITE TYPE	WELL	JOB 9144-02
FIELD DATA RECORD - GROU		`			1 1	NUMBER 7144 02
OJECT USAEC-FT. DEVENS	WEATHER LOU	$\frac{1}{2}$ $\frac{50s}{s}$		LOCATION STAR	it 1330) END 1630
SITE ID 57M-95-	SAMPL NUMBE	EMX57	D3X1 DATI	11-2-95	STUDY AR	EA 57
WATER LEVEL / WELL DATA	MEASURED FROM	PID HEA	DSPACE READINGS	WELL INTEGR	ITY	YES NO
WELL DEPTH FT	TOP OF WELL	BREATHI ZONE	NG O.O ppm	PROTECTIVE	CASING SECUR	E 🕅
WATER DEPTH 10.94 FT	TOP OF CASING		n n ppm	WELL LOCKED		\mathbf{k}
HEIGHT OF WATER COLUMN FT	WELL DIAMETER = 4	// HEAD	0.0 PA	PVC WELL CA	P PRESENT	3
\(\text{X} \times 1.68 \text{ gal/ft (4" well) = } \) \(\text{X} \text{ gal/ft (well) } \)	15,4 GAL	/VOL CASING :	STICK-UP 28	FT CAS	ECTIVE INGE/WELL FERENCE	0.3 FT
PURGE DATA VOLUME #	# (13:30) (13:	1917,11	31.52 4055	(16:25)	SA	MPLE OBSERVATION
GALLONS	13 15	4 20 8	4/ 2 /1/ /2	70		CLEAR
TEMPERATURE, deg. C	11.8 12.	2 12-0 1	12. i 12.0 1	2.0	¢	TURBID
pH units	rra In	6 601				COLORED
SPECIFIC CONDUCTIVITY, umho/cm	0.114 0.15			2/51		ODOR *
TURBIDITY' ntu	92 24	52 0.166 (1 7	215/		OTHER
REDOX (AT COMPLETION OF PURGIN		1000100d (10	ist KCl solut			(SEE NOTES)
	7001 11	CON CONTRACTOR	WIGE SON E	1091 101 2129	ox por	2)
SAMPLE PARAMETERS COLLECT	TED METHOD # F	FRACTION CODE	PRESERATIVE	VOLUME	SAMPLE BOTT	I C NIMOCO
svocs	UM18	MS	4C			CONTROL #
. N	GA 10	1713				
BEST (BCBS	19310	EC		2- 1L AG		- CONTROL #
PEST./PCBS	UW19	EC	4c	2- 1L AG	C D	- · · ·
voc	UW19 UM20	VP	4C HCL,4C	2- 1L AG 4- 40 ml AG	C D	- · · ·
VOC INORGANICS-UNFILTERED		VP N	4C HCL,4C HNO3 pH<2	2- 1L AG 4- 40 ml AG 1- 1L Poly	C D	
VOC INORGANICS-UNFILTERED INORGANICS-FILTERED		VP N NF	4C HCL,4C HNO3 pH<2 HNO3 pH<2	2- 1L AG 4- 40 ml AG 1- 1L Poly 1- 1L Poly	C D E F	- · · ·
VOC INORGANICS-UNFILTERED		VP N NF	4C HCL,4C HNO3 pH<2 HNO3 pH<2	2- 1L AG 4- 40 ml AG 1- 1L Poly 1- 1L Poly 1- 1L Poly	C D	G H IF MS/MSD COLLECTED IF DUPLICATE
INORGANICS-UNFILTERED INORGANICS-FILTERED WATER QUALITY PARAM. / TDS	UM20 * * * * 160.1	VP N NF C	4C HCL,4C HN03 pH<2 HN03 pH<2 4C H2S04 pH<2	2- 1L AG 4- 40 ml AG 1- 1L Poly 1- 1L Poly 1- 1L Poly 1- 1L Poly	C D E F I J K	G H IF MS/MSD COLLECTED
VOC INORGANICS-UNFILTERED INORGANICS-FILTERED WATER QUALITY PARAM.	UM20 * *	VP N NF	4C HCL,4C HNO3 pH<2 HNO3 pH<2	2- 1L AG 4- 40 ml AG 1- 1L Poly 1- 1L Poly 1- 1L Poly	C D E F	G H IF MS/MSD COLLECTED IF DUPLICATE
INORGANICS-UNFILTERED INORGANICS-FILTERED WATER QUALITY PARAM. / TDS	UM20 * * * 160.1 418.1	VP N NF C	4C HCL,4C HN03 pH<2 HN03 pH<2 4C H2S04 pH<2 H2S04 pH<2	2- 1L AG 4- 40 ml AG 1- 1L Poly 1- 1L Poly 1- 1L Poly 1- 1L Poly	C D E F I J K L M N	G H IF MS/MSD COLLECTED IF DUPLICATE COLLECTED BER OF IN-LINE
VOC INORGANICS-UNFILTERED INORGANICS-FILTERED WATER QUALITY PARAM. / TDS TPHC	UM20 * * * 160.1 418.1	VP N NF C S	4C HCL,4C HN03 pH<2 HN03 pH<2 4C H2S04 pH<2 H2S04 pH<2	2- 1L AG 4- 40 ml AG 1- 1L Poly 1- 1L Poly 1- 1L Poly 1- 1L Poly 2- 1L AG	C D E F I J K L M N	G H IF MS/MSD COLLECTED IF DUPLICATE COLLECTED
VOC INORGANICS-UNFILTERED INORGANICS-FILTERED WATER QUALITY PARAM. / TDS TPHC SAMPLING EQUIPMENT	UM20 * * 160.1 418.1	VP N NF C S	4C HCL,4C HNO3 pH<2 HNO3 pH<2 4C H2SO4 pH<2 H2SO4 pH<2	2- 1L AG 4- 40 ml AG 1- 1L Poly 1- 1L Poly 1- 1L Poly 2- 1L AG	C D E F I J K L M N	G H IF MS/MSD COLLECTED IF DUPLICATE COLLECTED BER OF IN-LINE
INORGANICS-UNFILTERED INORGANICS-FILTERED WATER QUALITY PARAM. / TDS TPHC SAMPLING EQUIPMENT WATER LEVEL EQUIPMENT USED:	UM20 * * 160.1 418.1	VP N NF C S	4C HCL,4C HNO3 pH<2 HNO3 pH<2 4C H2SO4 pH<2 H2SO4 pH<2 H2SO4 pH<2	2- 1L AG 4- 40 ml AG 1- 1L Poly 1- 1L Poly 1- 1L Poly 2- 1L AG SABLE PUMP (WHAL	C D E F I J K L M N	G H IF MS/MSD COLLECTED IF DUPLICATE COLLECTED BER OF IN-LINE
VOC INORGANICS-UNFILTERED INORGANICS-FILTERED WATER QUALITY PARAM. / TDS TPHC SAMPLING EQUIPMENT WATER LEVEL EQUIPMENT USED: ELECTRIC CONDUCTIVITY PRO	UM20 * * 160.1 418.1	VP N NF C S	4C HCL,4C HN03 pH<2 HN03 pH<2 4C H2S04 pH<2 H2S04 pH<2 G DEDICATED SUBMIRS	2- 1L AG 4- 40 ml AG 1- 1L Poly 1- 1L Poly 1- 1L Poly 2- 1L AG SABLE PUMP (WHAL	C D E F I J K L M N	G H IF MS/MSD COLLECTED IF DUPLICATE COLLECTED BER OF IN-LINE
INORGANICS-UNFILTERED INORGANICS-FILTERED WATER QUALITY PARAM. / TDS TPHC SAMPLING EQUIPMENT WATER LEVEL EQUIPMENT USED: FLOAT ACTIVATED OTHER	UM20 *	VP N NF C S C	4C HCL,4C HNO3 pH<2 HNO3 pH<2 4C H2SO4 pH<2 H2SO4 pH<2 H2SO4 pH<2 DEDICATED SUBMIRS DEDICATED TEFLON IN-LINE FILTER (1) OTHER	2- 1L AG 4- 40 ml AG 1- 1L Poly 1- 1L Poly 1- 1L Poly 2- 1L AG SABLE PUMP (WHAL BAILER INORGANICS)	E F I J K L M N NUM FIL	G H IF MS/MSD COLLECTED IF DUPLICATE COLLECTED BER OF IN-LINE IERS USED:
INORGANICS-UNFILTERED INORGANICS-FILTERED WATER QUALITY PARAM. / TDS TPHC SAMPLING EQUIPMENT WATER LEVEL EQUIPMENT USED: FLOAT ACTIVATED OTHER OTHER otes: * PAL inorganics: ICP may be a control of the control of	UM20 * 160.1 418.1 PUR BEE retals (SS10), AS rs: P04 (TF27),	VP N NF C S C GING SAMPLIN (SD21), SE (SD TKN (TF26), ŅI	HCL,4C HNO3 pH<2 HNO3 pH<2 HNO3 pH<2 4C H2SO4 pH<2 H2SO4 pH<2 G DEDICATED SUBMIRS DEDICATED TEFLON IN-LINE FILTER () OTHER 21), TL (SDO9), SB T (TF22), CL/SO4 ()	2- 1L AG 4- 40 ml AG 1- 1L Poly 1- 1L Poly 1- 1L Poly 2- 1L AG SABLE PUMP (WHAL BAILER INORGANICS) (SD28), PB (SD2(T10), TSS (160.	C D E F I J K L M N N FIL E) O), HG (SB01)	G H IF MS/MSD COLLECTED IF DUPLICATE COLLECTED BER OF IN-LINE IERS USED:
INORGANICS-UNFILTERED INORGANICS-FILTERED WATER QUALITY PARAM. / TDS TPHC SAMPLING EQUIPMENT WATER LEVEL EQUIPMENT USED: FLOAT ACTIVATED OTHER OTHER	UM20 * 160.1 418.1 PUR BE etals (SS10), AS rs: P04 (TF27),	VP N NF C S C GING SAMPLIN (SD21), SE (SD TKN (TF26), NI	HCL,4C HNO3 pH<2 HNO3 pH<2 HNO3 pH<2 4C H2SO4 pH<2 H2SO4 pH<2 H2SO4 pH<2 DEDICATED SUBMIRS DEDICATED TEFLON IN-LINE FILTER (1) OTHER 21), TL (SDO9), SB T (TF22), CL/SO4 (1)	2- 1L AG 4- 40 ml AG 1- 1L Poly 1- 1L Poly 1- 1L Poly 2- 1L AG SABLE PUMP (WHAL BAILER INORGANICS) (SD28), PB (SD2(T10), TSS (160.	C D E F I J K L M N N FIL E) O), HG (SB01)	G H IF MS/MSD COLLECTED IF DUPLICATE COLLECTED BER OF IN-LINE IERS USED:
INORGANICS-UNFILTERED INORGANICS-FILTERED WATER QUALITY PARAM. / TDS TPHC SAMPLING EQUIPMENT WATER LEVEL EQUIPMENT USED: FLOAT ACTIVATED OTHER OTH	# # # # # # # # # # # # # # # # # # #	VP N NF C S C GING SAMPLIN (SD21), SE (SD TKN (TF26), NI S - (abelle	HCL,4C HNO3 pH<2 HNO3 pH<2 HNO3 pH<2 4C H2SO4 pH<2 H2SO4 pH<2 G DEDICATED SUBMIRS DEDICATED TEFLON IN-LINE FILTER (1) OTHER 21), TL (SDO9), SB T (TF22), CL/SO4 (1)	2- 1L AG 4- 40 ml AG 1- 1L Poly 1- 1L Poly 1- 1L Poly 2- 1L AG SABLE PUMP (WHAL BAILER INORGANICS) (SD28), PB (SD2(T10), TSS (160.)	C D E F I J K L M N N FIL E) O), HG (SB01)	G H IF MS/MSD COLLECTED IF DUPLICATE COLLECTED BER OF IN-LINE IERS USED:
INORGANICS-UNFILTERED INORGANICS-FILTERED WATER QUALITY PARAM. / TDS TPHC SAMPLING EQUIPMENT WATER LEVEL EQUIPMENT USED: FLOAT ACTIVATED OTHER OTH	# # # # # # # # # # # # # # # # # # #	VP N NF C S C GING SAMPLIN (SD21), SE (SD TKN (TF26), NI S - (abelle	HCL,4C HNO3 pH<2 HNO3 pH<2 HNO3 pH<2 4C H2SO4 pH<2 H2SO4 pH<2 G DEDICATED SUBMIRS DEDICATED TEFLON IN-LINE FILTER (1) OTHER 21), TL (SDO9), SB T (TF22), CL/SO4 (1)	2- 1L AG 4- 40 ml AG 1- 1L Poly 1- 1L Poly 1- 1L Poly 2- 1L AG SABLE PUMP (WHAL BAILER INORGANICS) (SD28), PB (SD2(T10), TSS (160.)	C D E F I J K L M N N FIL E) O), HG (SB01)	G H IF MS/MSD COLLECTED IF DUPLICATE COLLECTED BER OF IN-LINE IERS USED:
INORGANICS-UNFILTERED INORGANICS-FILTERED WATER QUALITY PARAM. / TDS TPHC SAMPLING EQUIPMENT WATER LEVEL EQUIPMENT USED: FLOAT ACTIVATED OTHER OTHER	# # # # # # # # # # # # # # # # # # #	VP N NF C S C GING SAMPLIN (SD21), SE (SD TKN (TF26), NI S - (abelle	HCL,4C HNO3 pH<2 HNO3 pH<2 HNO3 pH<2 4C H2SO4 pH<2 H2SO4 pH<2 G DEDICATED SUBMIRS DEDICATED TEFLON IN-LINE FILTER (1) OTHER 21), TL (SDO9), SB T (TF22), CL/SO4 (1)	2- 1L AG 4- 40 ml AG 1- 1L Poly 1- 1L Poly 1- 1L Poly 2- 1L AG SABLE PUMP (WHAL BAILER INORGANICS) (SD28), PB (SD2(T10), TSS (160.)	C D E F I J K L M N N FIL E) O), HG (SB01)	G H IF MS/MSD COLLECTED IF DUPLICATE COLLECTED BER OF IN-LINE IERS USED:

ABB ENVIRONMENTAL SERVICES, INC.	5115 TYPE [511
FIELD DATA RECORD - GROUNDWATER	FILE TYPE CGW SITE TYPE WELL JOB 9144-02 NUMBER
PROJECT USAEC-FT. DEVENS WEATHER METHER	NAM, SCS LOCATION START 1255 END 1345
SITE ID 57M-95-04A SAMPLE W	X570441 DATE 11-1-95 STUDY AREA 57
WATER LEVEL / WELL DATA MEASURED FROM	PID HEADSPACE READINGS WELL INTEGRITY YES NO
WELL DEPTH FT TOP OF WELL	BREATHING 0.0 ppm PROTECTIVE CASING SECURE
WATER DEPTH . 3-12 FT TOP OF CASING	WELL LOCKED
HEIGHT OF WELL 4 "	HEAD PVC WELL CAP PRESENT
\mathbb{Z} x 1.68 gal/ft (4" well) = 18.0 GAL/VOL	PROTECTIVE CASING STICK-UP 1.5 FT CASINGE/WELL 0.4 FT FROM GROUND DIFFERENCE
PURGE DATA VOLUME # 1/13:03) 2/13:19 3	(14:01) TH-22 (14:54) SAMPLE OBSERVATION
	54 72 90 CLEAR
TEMPERATURE, deg. C 12.9 13.2	BO 13.3 13.2
pH units 5-97 5.90 9	5.91 5.83 5.85 COLORED
SPECIFIC CONDUCTIVITY, umho/cm 0-093 0.090 0	088 0.089 0.085 ODOR
TURBIDITY' ntu	O O O O O O O O O O O O O O O O O O O
REDOX (AT COMPLETION OF PURGING) 1914 m	
SAMPLE PARAMETERS COLLECTED METHOD # FRACTI	ON CODE PRESERATIVE VOLUME SAMPLE BOTTLE NUMBER
svocs . X um18 ms	4C 2- 1L AG A B CONTROL #_173
PEST./PCBS X, UW19 EC	4C 2- 1L AG C D
VOC UM20 VP	HCL,4C 4- 40 ml AG E F G H
INORGANICS-UNFILTERED * N	HNO3 pH<2 1- 1L Poly I
INORGANICS-FILTERED * NF	
WATER QUALITY PARAM. * C	4C 1- 1L Poly K
/ TDS 160.1	H2SO4 pH<2 1- 1L Poly L COLLECTED
трнс 418.1 с	H2SO4 pH<2 2- 1L AG M N
SAMPLING EQUIPMENT PURGING	SAMPLING NUMBER OF IN-LINE
WATER LEVEL EQUIPMENT USED:	DEDICATED SUBMIRSABLE PUMP (WHALE)
ELECTRIC CONDUCTIVITY PROBE	DEDICATED TEFLON BAILER
FLOAT ACTIVATED	IN-LINE FILTER (INORGANICS)
OTHER	OTHER
Notes: * PAL inorganics: ICP metals (SS10), AS (SD21)	, SE (SD21), TL (SD09), SB (SD28), PB (SD20), HG (SB01).
	1926), NIT (1922), CL/SO4 (1110), TSS (160.2), ALK (301.0), HARDNESS.
- Tridescent sheen on we	tter surface. Turged wholer was
placed in drums. Attended between purps	x this well and parging 57M-9508A.
- Attempted between puff	SAMPLERS SIGNATURE John Mark Bridge
	\bigvee

ABB ENVIRONMENTAL SERVICES, I	NC.					
FIELD DATA RECORD - GROU		FI	LE TYPE CGW	SITE TYPE	WELL	JOB 9144-02 NUMBER
OJECT USAEC-FT. DEVENS	WEATHER Diagram	le windy	, 50s	LOCATION STAR	15:00) END 14 1650
SITE ID 57M95	OVB SAMPLE SAMPLE	MX 4570	4B1 DATE		STUDY A	177
WATER LEVEL / WELL DATA	MEASURED FROM	PID HEADSPA	CE READINGS	WELL INTEGR	ITY	YES NO
WELL DEPTH FT	TOP OF WELL	BREATHING ZONE	0.0 ppm	PROTECTIVE (CASING SECU	RE
WATER DEPTH 3.96 FT	TOP OF CASING WELL	WELL HEAD	0.1 ppm	WELL LOCKED PVC WELL CAF	PRESENT	
WATER COLUMN FT	DIAMETER = 7	PROTECTIVE		II	CTIVE	
x 1.68 gal/ft (4" well) = gal/ft (well)	35 (34.84) VOL	FROM GROUND	(-UP Z.5	l l	NGE/WELL ERENCE	0,2 FT
PURGE DATA VOLUME	# (15:20) (15:36)	35:50 16:	16 (17:00)			SAMPLE OBSERVATION
GALLONS	35 70	105 140	11757			CLEAR
TEMPERATURE, deg. C	12.0 12.1	11.9 12.	1 11.9			TURBID
pH units	5-86 5.77	5.80 5.7	72 5.68			COLORED
SPECIFIC CONDUCTIVITY, umho/cm	0.213 0.214	0.213 0.2	0 0.07			ODOR
TURBIDITY' ntu	10	70 O	0			OTHER (SEE NOTES)
REDOX (AT COMPLETION OF PURGIN	(G) 345					- (SEE NOTES)
SVOCS PEST./PCBS COLLECT	UM18 UW19	MS EC	PRESERATIVE 4C 4C	VOLUME 2- 1L AG 2- 1L AG	A E	
voc	UM20	VP	HCL,4C	4- 40 ml AG	E F	G H
INORGANICS-UNFILTERED	*	N	HN03 pH<2	1- 1L Poly	<u> </u>	
INORGANICS-FILTERED	*	NF	HNO3 pH<2	1- 1L Poly		IF MS/MSD COLLECTED
WATER QUALITY PARAM. X	* 160.1	С	40	1- 1L Poly	<u>K</u>	IF DUPLICATE
		S	H2\$04 pH<2	1- 1L Poly	L	COLLECTED
трнс	418.1	С	H2S04 pH<2	2- 1L AG	M N	
SAMPLING EQUIPMENT	PURGIN	/ 5/			FI	MBER OF IN-LINE LTERS USED:
WATER LEVEL EQUIPMENT USED:		14/		SABLE PUMP (WHALI	E)	
ELECTRIC CONDUCTIVITY PRO	BE	DE	DICATED TEFLON	BAILER		
FLOAT ACTIVATED		IN N	-LINE FILTER (I	(NORGANICS)		1
OTHER		οτ	HER			
Notes: * PAL inorganics: ICP m Water Quality Paramete	metals (SS10), AS (SD: ers: PO4 (TF27), TKN	21), SE (SD21), (TF26), NIT (T	TL (SD09), S8 F22), CL/SO4 (T	(SD28), PB (SD20	3), HG (SB0 2), ALK (30	1). 1.0), HARDNESS.
		samplers s	I GNATURE	ah Monte	mar	4
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ABB ENVIRONMENTAL SERVICES, INC.	_		7		
FIELD DATA RECORD - GROUNDWATER	7 ,	ILE TYPE CGW	SITE TYPE	WELL	JOB 9144-02 NUMBER
	ain, 50s		LOCATION STAR	0835	END 0935
SITE ID 57M9505X SAM NUM	PLE MX570	SX1 DATE	11-2-95	STUDY AF	REA 57
WATER LEVEL / WELL DATA MEASURED FROM	PID HEADSPA	CE READINGS	WELL INTEGRI	TY	YES NO
WELL DEPTH FT TOP OF WELL	BREATHING ZONE	\mathcal{O} , \mathcal{O} ppm	PROTECTIVE (ASING SECUR	E 🕅 📗
WATER DEPTH 15.53 FT TOP OF CASIL		O.O ppm	WELL LOCKED		
HEIGHT OF WELL WATER COLUMN FT DIAMETER =	HEAD	010 PF	PVC WELL CAP	PRESENT	
	PROTECTIVE CASING STIC FROM GROUND		FT CASI	CTIVE NGE/WELL ERENCE	O.S FT
PURGE DATA VOLUME # 1 60:39 6	3:47 308:50 109	:04 5 (ca:13)		<u>s</u>	AMPLE OBSERVATION
GALLONS 11.4 2	8 34.2 45	6 57.0		}	CLEAR
TEMPERATURE, deg. C 13.5 13	9 13.8 13.8	3 14.1			TURBID
pH units . 5.68 5.	81 5.81 5.8	25.84			COLORED
SPECIFIC CONDUCTIVITY, umho/cm	085 0,085 0,0	36 0.086			ODOR
TURBIDITY' ntu	00	0			OTHER (SEE NOTES)
REDOX (AT COMPLETION OF PURGING) 32	1.9 InV				
SAMPLE PARAMETERS COLLECTED METHOD #	FRACTION CODE I	PRESERATIVE	VOLUME	SAMPLE BOTT	TLE NUMBER
svocs . Um18	MS	4C	2- 1L AG	А , В	CONTROL # 174
PEST./PCBS UW19	EC	4C	2- 1L AG	C D	_
VOC UM20	VP	HCL,4C	4- 40 ml AG	E F	G H
INORGANICS-UNFILTERED *	N	HN03 pH<2	1- 1L Poly	I	
INORGANICS-FILTERED *	NF	HNO3 pH<2	1- 1L Poly	J	IF MS/MSD COLLECTED
WATER QUALITY PARAM. X * 160.1	С	4C	1- 1L Poly	K	IF DUPLICATE
7 100.1	S	H2S04 pH<2	1- 1L Poly	L	COLLECTED
TPHC 418.1	. с	H2SO4 pH<2	2- 1L AG	M N	_
SAMPLING EQUIPMENT PI	JRGING SAMPLING			NUM	BER OF IN-LINE
WATER LEVEL EQUIPMENT USED:		DICATED SUBMIRS	ABLE PUMP (WHALE		TERS USED:
ELECTRIC CONDUCTIVITY PROBE		DICATED TEFLON E	BAILER	L	
FLOAT ACTIVATED	T IN	-LINE FILTER (II	ORGANICS)		
OTHER		HER			
Notes: * PAL inorganics: ICP metals (SS10), As	(SD21), SE (SD21),	TL (SD09), S8 ((SD28), P8 (SD20), HG (SB01).
Water Quality Parameters: PO4 (TF27)	, ikn (irzo), Mil (i	ree), UL/3U4 (11	10), 155 (100.2	,, MEK (301	.U), MAKUNESS.
·) /		
			4.1 1/1.		
	SAMPLERS S	IGNATURE	van N 10.	MOOM	m

ADD PHYTOGRAPHITAL BERLY ARE	· · · · · · · · · · · · · · · · · · ·			
ABB ENVIRONMENTAL SERVICES, INC	•	FILE TYPE CO	W SITE TYPE	WELL JOB 9144-02
FIELD DATA RECORD - GROUND	WEATHER Rain	50s 7	LOCATION STAR	790
SSECT SSAES TT. SEVERS	FIELD SA	2	ACTIVITY STAR	0835 0952 1110
SITE ID 57M-95-0	SAMPLE STANDARD	MYOGXI M	II-Z-95	STUDY AREA 57
WATER LEVEL / WELL DATA M	EASURED FROM	PID HEADSPACE READINGS	WELL INTEGR	TY YES NO
WELL DEPTH FT		BREATHING DO ppm	PROTECTIVE (CASING SECURE
WATER DEPTH 13.83 FT	TOP OF CASING	WELL OP ppm	WELL LOCKED	
		HEAD OF PARTIES	PVC WELL CAR	PRESENT
x 1.68 gal/ft (4" well) = gal/ft (well)	18 7 GAL/VOL	PROTECTIVE CASING STICK-UP Z.3	FT CASI	NGE/WELL Q FT
PURGE DATA VOLUME #	19/10/2 (1005) CI	0/6 3032 (1049)	5/1101	SAMPLE OBSERVATION
GALLONS	0 18.2 36	4 54.6 72.8	91.0	CLEAR
TEMPERATURE, deg. C	12.4 13.2 13	4 13-5 13.4	13-0	TURBID
pH units	0.088 0.085 0.0	986 0.088 0.089	0.090	COLORED
SPECIFIC CONDUCTIVITY, umho/cm	5.87 5.96 5.	97 600 5.97	5.93	ODOR
TURBIDITY' ntu	9 3 8	000	0	OTHER (SEE NOTES)
REDOX (AT COMPLETION OF PURGING	277.4 W	nV		
MAMPLE PARAMETERS COLLECTED	METHOD # FRACTION	. CODE PRESERATIVE	VOLUME	SAMPLE BOTTLE NUMBER 177
svocs	UM18 MS	4c	2- 1L AG	A B CONTROL #
PEST./PCBS	UW19 EC	4c	2- 1L AG	C D
voc X	UM20 VP	HCL,4C	4- 40 ml AG	E F G H
INORGANICS-UNFILTERED	* N	нч 2	1- 1L Poly	I
INORGANICS-FILTERED X	* NF	2>Нq ЕОИН	1- 1L Poly	J [F MS/MSD
WATER QUALITY PARAM.	* C	•	1- 1L Poly	K COLLECTED
/ TDS ELJ	160.1 S	H2SO4 pH<2	1- 1L Poly	L IF DUPLICATE COLLECTED
трнс	418.1 C	H2S04 pH<2		M N
1501				
SAMPLING EQUIPMENT	PURGING	SAMPLING		NUMBER OF IN-LINE FILTERS USED:
WATER LEVEL EQUIPMENT USED:	M	DEDICATED SUBMI	RSABLE PUMP (WHALE	
ELECTRIC CONDUCTIVITY PROBE		DEDICATED TEFLO	ON BAILER	
FLOAT ACTIVATED		IN-LINE FILTER	(INORGANICS)	
OTHER	·	OTHER		
Notes: * PAL inorganics: ICP met	als (\$\$10), A\$ (\$D21).	SE (SD21), TL (SD09). S	SB (SD28), PB (SD20)), HG (SB01).
Water Quality Parameters	: PO4 (TF27), TKN (TF	26), NIT (TF22), CL/S04	(TT10), TSS (160.2	2), ALK (301.0), HARDNESS.
		,		
		(1,11	-
		SAMPLERS SIGNATURE	Alch / IN	Teonery
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ABB ENVIRONMENTAL SERVICES, INC				7	41.	ina [01// 00]
FIELD DATA RECORD - GROUND	WATER	FI	LE TYPE CGW	SITE TYPE	WELL	JOB 9144-02 humber
PROJECT USAEC-FT. DEVENS	WEATHER	ldy, 40s		LOCATION START	1536	END 1640
SITE 10 57M-95-6	FIELD SAMPLE NUMBER	MX570	7X1 DATE	10-31-95	STUDY A	REA 57
WATER LEVEL / WELL DATA M	EASURED FROM	PID HEADSPA	CE READINGS	WELL INTEGRI	<u>TY</u>	YES NO
WELL DEPTH FT	TOP OF WELL	BREATHING ZONE	O.O ppm	PROTECTIVE C	ASING SECU	RE 🕍 📗
WATER DEPTH 3.49 FT	TOP OF CASING	WELL	n ppm	WELL FOCKED		\times
	WELL DIAMETER = 4	HEAD L	<i>U.1</i>	PVC WELL CAP		
X 1.68 gal/ft (4" well) =	19.0 GAL/VOL	PROTECTIVE CASING STICE FROM GROUND	(-UP 1.5	FT CASI	CTIVE NGE/WELL Erence	0.3 FT
PURGE DATA VOLUME #	initial 1901 1536 1545	388 2 57.0	9 1624 9	5.05	3	SAMPLE OBSERVATION
GALLONS	0 19.0	38.0 57	07609	50		CLEAR
TEMPERATURE, deg. C	13.2 13.3	B.4 13.4	1 13.3			TURBID
pH units	5.56 5.59	5.53 5,5	25.59			COLORED
SPECIFIC CONDUCTIVITY, umho/cm	0.136 0137	0.133 0.13	3 O.B.F			ODOR
TURBIDITY' ntu	00	0 0	0			OTHER (SEE NOTES)
REDOX (AT COMPLETION OF PURGING)		· · · · · · · · · · · · · · · · · · ·			
		•				
SAMPLE PARAMETERS COLLECTER			RESERATIVE	VOLUME		TLE NUMBER
SVOCS		MS	4C	2- 1L AG	A E	
PEST./PCBS		EC VP	4C	2- 1L AG 4- 40 ml AG	E F	
INORGANICS-UNFILTERED		N	HCL,4C HNO3 pH<2	1- 1L Poly		
INORGANICS - FILTERED		NF	HNO3 pH<2	1- 1L Poly		IF MS/MSD
WATER QUALITY PARAM.		C.	4C	1- 1L Poly		COLLECTED
/ TDS	160.1	s	H2SO4 pH<2	1- 1L Poly		IF DUPLICATE COLLECTED
трнс 📈	418.1	C	H2SO4 pH<2	2- 1L AG		
£	•		,			-
SAMPLING EQUIPMENT	PURGIN	G SAMPLING	······································		NU	MBER OF IN-LINE
WATER LEVEL EQUIPMENT USED:		DEI	DICATED SUBMIRSA	ABLE PUMP (WHALE		LTERS USED:
ELECTRIC CONDUCTIVITY PROBE		DE	DICATED TEFLON E	BAILER		
FLOAT ACTIVATED	H	X in	-LINE FILTER (II	NORGANICS)		
OTHER		J 07	HER			<u>-</u>
Notes: * PAL inorganias. Ton	ale (\$210) 45 (\$2	21) er (ch21)	TI (0000) 07	(ch29) DE (ch20) UC (CD)	1)
Notes: * PAL inorganics: ICP met Water Quality Parameters	: PO4 (TF27), TKN	(TF26), NIT (T	it (SDO9), SB (F22), CL/SO4 (T1	(5028), PB (5020 T10), TSS (160.2), HG (SBO), ALK (30	1.0), HARDNESS.
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				Irah Mor	Noom	and

ABB ENVIRONMENTAL SERVICES, IN	c.		ELLE TYPE GOLL	7 6175 7005	Lieu	100 01// 02	\prod
FIELD DATA RECORD - GROUN	DWATER	, e <u>, e</u> e	FILE TYPE CGW	SITE TYPE	WELL	JOB 9144-02 NUMBER]
OJECT USAEC-FT. DEVENS	WEATHER DUI	33(e) 1	windy, sos	LOCATION STAR	0800	9 END 1345	
SITE ID 57M95	DBA SAMPLE NUMBER	PEKM	70841 DATE	11-1-95	STUDY A	1 21/7	
WATER LEVEL / WELL DATA	MEASURED FROM	PID HEA	ADSPACE READINGS	WELL INTEGR	<u>ITY</u>	YES NO	
WELL DEPTH FT	TOP OF WELL	BREATH]	ING O.O ppm	PROTECTIVE	CASING SECU	IRE A	
WATER DEPTH 3.0 FT	TOP OF CASING	WELL O		WELL LOCKED PVC WELL CAR	DOSCSWIT		
WATER COLUMN FT	DIAMETER =	PROTECT	ب 4 . با		CTIVE		
X 1.68 gal/ft (4" well) = gal/ft (well)	20.8 GAL/1		STICK-UP 3	FT CASI	NGE/WELL ERENCE	0,3 FT	
PURGE DATA VOLUME #	(0800) (082	65 (0920)	1200) (1230) 5	1335)		SAMPLE OBSERVATION	
GALLONS	0 20.8	141.6	62.4 832 10	4.0		CLEAR	
TEMPERATURE, deg. C	12,1 116	12.1	11-7 12-3 1	2./		TURBID	
pH units	5.36 5.57	5.55	5.87 5.93 5	89		COLORED	
SPECIFIC CONDUCTIVITY, umho/cm	0.129	+0.079	0.076 0.069 0.	075		ODOR	
TURBIDITY' ntu	43 951	31	4 9	0		OTHER (SEE NOTES)	
REDOX (AT COMPLETION OF PURGING	1) 243.0	mV				- (SEE NOTES)	
MAPLE PARAMETERS COLLECTE	ED METHOD # FR	ACTION CODE	PRESERATIVE	VOLUME	SAMPLE BOT	TLE NUMBER	
svocs	UM18	MS	4C	2- 1L AG	A E	CONTROL # 181	24
PEST./PCBS	UW19	EC	4C	2- 1L AG	CD		
voc S	UM20	VP	HCL,4C	4- 40 ml AG	E F		
INORGANICS-UNFILTERED ,	*	N	HNO3 pH<2	1- 1L Poly	I		
INORGANICS-FILTERED	*	NF	HN03 pH<2	1- 1L Poly		IF MS/MSD	
WATER QUALITY PARAM.	*	С	40	1- 1L Poly	К	COLLECTED	
/ TDS LZ	160.1	s	H2SO4 pH<2	1- 1L Poly		IF DUPLICATE COLLECTED	
трнс .	418.1	С	H2SO4 pH<2	2- 1L AG	<u>м</u> м		
4						_	
SAMPLING EQUIPMENT	PURG	ING SAMPLIN	łG			MBER OF IN-LINE	1
WATER_LEVEL EQUIPMENT USED:	[5		DEDICATED SUBMIRS	ABLE PUMP (WHALE		LTERS USED:	
ELECTRIC CONDUCTIVITY PROB	E	☆	DEDICATED TEFLON	BAILER			1
FLOAT ACTIVATED		X	IN-LINE FILTER (I	NORGANICS)			
OTHER			OTHER				
	<u></u>						
Notes: * PAL inorganics: ICP me Water Quality Parameter	s: PO4 (TF27), TI	KN (TF26), NI	IT (TF22), CL/SO4 (T	T10), TSS (160.2), ALK (30	1). 1.0), HARDNESS.	
- Slow rechange	; altern	ated le	etween p	ouging	The	\$	
- Slow rechange Well and purgi	ing SZM	-95-08	3₽, (*)0 (),	1	ü	
1 0	/			and 1	/host	08222	
	<u> </u>	SAMPLE	ERS SIGNATURE	mun 1	JUNG	The server	
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ABB ENVIRONMENTAL SERVICES, INC.				
FIELD DATA RECORD - GROUNDWATER		FILE TYPE CGW	SITE TYPE WEL	L JOB 9144-02 NUMBER
PROJECT USAEC-FT. DEVENS WEATH	Diggle, wird	y, 50s	LOCATION START DE	80 END 1/55
SITE ID 57M-95-082	SAMPLE MX57	BB1 DATE	: 11-1-95 st	CUDY AREA 57
WATER LEVEL / WELL DATA MEASURED	FROM PID HEADS	PACE READINGS	WELL INTEGRITY	YES NO
WELL DEPTH FT TOP C	F WELL BREATHING	OD ppm	PROTECTIVE CASING	SECURE TO THE SECURE
WATER DEPTH 3.82 FT TOP C	ZONE F CASING		WELL LOCKED	
HEIGHT OF WELL DIAMETE		D.C ppm	PVC WELL CAP PRES	
x 1.68 gal/ft (4" well) = 34	Z GAL/VOL CASING STI FROM GROUN	CK-UP 22	FT POTECTIVE CASINGE/W	ELL D. FT
PURGE DATA VOLUME # INTITIO	10912) 20940 300	1053)	(1134)	SAMPLE OBSERVATION
GALLONS	34.7 69.4 10	4.1 38.8	13 .5	CLEAR
TEMPERATURE, deg. C	11.1 11.3	13 1/3 /	12-0	TURBID
of units 5.40	5.53 5.70 5.	74 5.90 5	5.91	COLORED
PECIFIC CONDUCTIVITY, umho/cm 0.22	3 0.724 0 222 02	17 0.218 0.	2.19	CDOR
URBIDITY' ntu	012	2	0	OTHER COSE NOTES
EDOX (AT COMPLETION OF PURGING)	277 mV			(SEE NOTES)
SAMPLE PARAMETERS COLLECTED METH SVOCS UM PEST./PCBS UW VOC UM INORGANICS-UNFILTERED *	18 MS 19 EC	PRESERATIVE 4C 4C HCL,4C HNO3 pH<2	VOLUME SAMPL 2- 1L AG A 2- 1L AG C 4- 40 ml AG E 1- 1L Poly I	B CONTROL # 183
INORGANICS-FILTERED *	NF	HN03 pH<2	1- 1L Poly J	IF MS/MSD
WATER QUALITY PARAM. * 160	C	4c	1- 1L Poly K	- COLLECTED - IF DUPLICATE
/ TDS 2 160	s s	H2S04 pH<2	1- 1L Poly L	COLLECTED
трнс 2 418	c.1 C	H2SO4 pH<2	2- 1L AG M	
AMPLING EQUIPMENT	PURGING SAMPLING			NUMBER OF IN-LINE
WATER LEVEL EQUIPMENT USED: ELECTRIC CONDUCTIVITY PROBE FLOAT ACTIVATED OTHER		DEDICATED SUBMIRS DEDICATED TEFLON IN-LINE FILTER (I		FILTERS USED:
tes: * PAL inorganics: ICP metals (SS Water Quality Parameters: PO4	(TF27), TKN (TF26), NIT (TF22), CL/S04 (T	T10), TSS (160.2), ALI	((301.0), HARDNESS.
- Alternated between	1 purging th		1, 4, 0, 1	
	SAMPLERS	SIGNATURE	bh Mortean	1044

ABB ENVIRONMENTAL SERVICES, INC				
FIELD DATA RECORD - GROUND		FILE TYPE C	GW SITE TYPE WE	JOB 9144-02 NUMBER
COJECT USAEC-FT. DEVENS	WEATHER Partly	bridy 40s	LOCATION START	900 END 1030 -
SITE ID 63M 92	DZX SAMPLE M	XG30ZX1 º		STUDY AREA 57
WATER LEVEL / WELL DATA M	EASURED FROM	PID HEADSPACE READINGS	WELL INTEGRITY	YES NO
WELL DEPTH 33.38 FT	TOP OF WELL	BREATHING O.O ppm	PROTECTIVE CASIN	g SECURE
WATER DEPTH 26.95 FT	TOP OF CASING	WELL Oppm	WELL LOCKED	25/17
	WELL DIAMETER = 4"	HEAD PROTECTIVE	PVC WELL CAP PRE	& L
x 1.68 gal/ft (4" well) = gal/ft (well)	14.0 GAL/VOL	PROTECTIVE CASING STICK-UP FROM GROUND 2	POTECTIVE CASINGE/DIFFEREN	WELL 77 S FT
PURGE DATA VOLUME #	(0900) (0916) 2	(1003) (1946)	5	SAMPLE OBSERVATION
GALLONS	0 14	28 42 56	70	CLEAR
TEMPERATURE, deg. C		2.9 12.9 12.9	12.9	TURBID
pH units	5,9% 6.01	5.99 5.99 5.99	5,99	COLORED
SPECIFIC CONDUCTIVITY, umbo/cm	0.195 0.158	0.140 0.146 0.139	0.147	ODOR
TURBIDITY' ntu	20	0 0 0	9	OTHER (SEE NOTES)
REDOX (AT COMPLETION OF PURGING) (mV) 330.7	, , ,		, , , , , , , , , , , , , , , , , , , ,
SAMPLE PARAMETERS COLLECTER	D METHOD # FRACTI	ON CODE PRESERATIVE	VOLUME SAM	PLE BOTTLE NUMBER
svocs	UM18 MS	4C	2- 1L AG A	B CONTROL # 163
PEST./PCBS	UW19 EC		2- 1L AG C	D
voc 🔀	UM20 VP	•	4- 40 ml AG E	F G H
INORGANICS-UNFILTERED	* N	HNO3 pH<2	1- 1L Poly I	
INORGANICS-FILTERED	* NF		1- 1L Poly J	IF MS/MSD COLLECTED
WATER QUALITY PARAM. X	* C	4C	1- 1L Poly K	IF DUPLICATE
\(\frac{1}{2}\cdot\)	\$	H2SO4 pH<2		— COLLECTED
TPHC 💹	418.1 C	H2SO4 pH<2	2 2- 1L AG M	N N
CAMOLING FOULTHEAT	Bilborn	CAMPLING		MINOSO OS TRATAS
SAMPLING EQUIPMENT	PURGING	SAMPLING	ITDOADE DUMO ZUMALEN	NUMBER OF IN-LINE FILTERS USED:
WATER LEVEL EQUIPMENT USED:	_ 4		IRSABLE PUMP (WHALE)	
ELECTRIC CONDUCTIVITY PROBE	-	DEDICATED TEFL		
FLOAT ACTIVATED		IN-LINE FILTER		
OTHER		OTHER		· · · · · · · · · · · · · · · · · · ·
Notes: * PAL inorganics: ICP met Water Quality Parameters), SE (SD21), TL (SD09), TF26), NIT (TF22), CL/SO4		
				-
			\bigcap , \bigcap I \bigwedge	
	- 41	SAMPLERS SIGNATURE	Sorah S. Mr.	Maney

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ABS ENTROMERTAL SERVICES, INC. FIELD TYPE COLU. STATE TYPE WELL WAS GROUND FOR PROJECT WAS GROWN BEATHER BATH COMMY. SITE 10 GBM - 92 - 07 M SAMPLE MANGER BATH COMMY. SITE 10 GBM - 92 - 07 M SAMPLE MANGER BATH COMMY. SITE 10 GBM - 92 - 07 M SAMPLE MANGER BATH COMMY. SITE 10 GBM - 92 - 07 M SAMPLE MANGER BATH COMMY. SITE 10 GBM - 92 - 07 M SAMPLE MANGER BATH COMMY. SITE 10 GBM - 92 - 07 M SAMPLE MANGER BATH COMMY. SITE 10 GBM - 92 - 07 M SAMPLE MANGER BATH COMMY. SITE 10 GBM - 92 - 07 M SAMPLE FROM GROUND SAMPLE BATH COMMY. SITE 10 GBM - 92 - 07 M SAMPLE MANGER SAMPLE BATH COMMY. SITE 10 GBM - 92 - 07 M SAMPLE MANGER SAMPLE BATH COMMY. SITE 10 GBM - 92 - 92 M SAMPLE BATH COMMY. SITE 10 GBM - 92 - 92 M SAMPLE BATH COMMY. SITE 10 GBM - 9		•					
PROJECT UBACE-FT. DEVENS WEATHER THAT CADAY FIELD SITE 10 CDM - DZ - DTX SAMPLE MXCBJPT J DATE WATER LEVEL / VELL DATA WEAURED FROM WELL DEPTH ZT LOS # ACCOUNTY TOP OF CASING WELL DEPTH WATER DEPTH J DATE WELL LOCKED TOP OF CASING WELL LOCKED WELL LOCKED TOP OF CASING WELL LOCKED TOP OF CASING WELL LOCKED WELL LOCKED PROTECTIVE CASING SECURE WELL LOCKED TOP OF WELL CAS A		•		FILE TYPE CGW	SITE TYPE	WELL	
SITE ID GRAM-02-07X MARGE MXG207X DATE 10-31-95 STUDY AREA WATER LEVEL / VELL DATA NAMED MXG207X MID DATE WELL SEPTIN 27-65-11 TO OF CASING WELL DATE WATER DEPTIN 27-65-11 TO OF CASING WELL DATE WATER DEPTIN 27-65-11 TO OF CASING WELL DATE WATER DEPTIN 27-65-11 TO OF CASING WELL WELL COMMETCOLOUNG WELL DEPTIN 27-65-11 TO OF CASING WELL WELL COMMETCOLOUNG WELL DEPTIN 27-65-11 TO OF CASING WELL DATE CASING SECURE WELL LOCKED PVC WELL CAP PRESENT POPOETTIVE WATER OLDINA WELL DATE CASING SECURE WELL LOCKED PVC WELL CAP PRESENT POPOETTIVE WELL CASING SECURE WELL LOCKED PVC WELL CAP PRESENT POPOETTIVE WELL CASING SECURE WELL DATE CASING SECURE WELL COCKED PVC WELL CAP PRESENT POPOETTIVE CASING SECURE WELL COCKED PVC WELL CAP PRESENT POPOETTIVE WELL COCKED PVC WELL CAP PRESENT DOTTER WELL COCKED PVC WELL CAP PRESENT DOTTER WELL COCKED PVC WELL CAP PRESENT DOTTER CASING STICK-UP 2.3 F1 CASING SECURE WELL COCKED PVC WELL CAP PRESENT DOTTER CASING STICK-UP 2.3 F1 CASING SECURE WELL COCKED PVC WELL CAP PRESENT DOTTER WELL COCKED PVC WELL CAP PRESENT DOTTER CASING STICK-UP 2.3 F1 CASING SECURE WELL COCKED PVC WELL CAP PRESENT DOTTER CASING STICK-UP 2.3 F1 CASING SECURE WELL COCKED PVC WELL CAP PRESENT DOTTER CASING STICK-UP 2.3 F1 CASING SECURE DOTTER TURBIDITY TURBIDITY TURBIDITY TO CALL TURBIDITY TO CASING STICK-UP 2.3 F1 CASING SECURE TURBIDITY TURBIDITY TURBIDITY TO COCKED DOTTER CASING STICK-UP 2.3 F1 CASING SECURE TURBIDITY TUR	<u> </u>	一	Butty cloud	4. 40e	LOCATION START	1136	
MATER LEVEL / WELL DATA WELL DETAIL WATER LEVEL / WELL DATA TOP OF WELL BREATRING O O PP TOP OF CASING WELL LOCKED WELL LOCKED PYC WELL CASING SECURE WELL LOCKED PYC WELL CASING SECURE WELL LOCKED PYC WELL CASING SECURE WELL LOCKED PYC WELL CASING SECURE WELL LOCKED PYC WELL CASING SECURE WELL LOCKED PYC WELL CASING SECURE WELL LOCKED PYC WELL CASING SECURE WELL LOCKED PYC WELL CASING SECURE WELL LOCKED PYC WELL CASING SECURE WELL LOCKED PYC WELL CASING SECURE WELL LOCKED PYC WELL CASING SECURE WELL LOCKED PYC WELL CASING SECURE WELL WITH CONTROLL DEDAMETER = 11	SITE ID (3 M 93			DOZVI DATE	r		
WELL DEPTH 27.65 FT TOP OF WELL SREATHING D.O. POP PROTECTIVE CASING SECURE WELL LOCKED WELL LOCKED WELL LOCKED WELL LOCKED WELL LOCKED WELL LOCKED WELL LOCKED WELL LOCKED WELL LOCKED WELL CAP PRESENT WELL CAP PRESENT WELL CAP PRESENT WELL CAP PRESENT WELL CAP PRESENT WELL CAP PRESENT WELL CAP PRESENT WELL CAP PRESENT TOP OF CASING STICK-UP Z-3 FT CASING-WELL D.Z FT CASING-WELL D.Z FT CASING-WELL CAP PRESENT TOP CASING STICK-UP Z-3 FT CASING-WELL D.Z FT CASING-WELL		NUI	ABER MANAGE		ברוכטון	J (AOC)	
WELET OF WITER COLLECTED METHOD # FRACTION CODE PRESERTIVE VOLUME SAMPLE PARAMETERS COLLECTED METHOD # FRACTION CODE PRESERTIVE VOLUME SAMPLE PARAMETERS COLLECTED METHOD # FRACTION CODE PRESERTIVE VOLUME SAMPLE PARAMETERS COLLECTED METHOD # FRACTION CODE PRESERTIVE VOLUME SAMPLE PARAMETERS COLLECTED METHOD # FRACTION CODE PRESERTIVE VOLUME SAMPLE BOTTLE NUMBER SYCCS UN18 NS 4C 2-1L AG A B CONTROL #165 NOTES NOT		1 - /					B 1
HEIGHT OF MATER COLUMN PT PT WHITE OLUMN PT PT WATER COLUMN PT PT WATER COLUMN PT PT WATER COLUMN PT PT WATER COLUMN PT PT PROTECTIVE PR	21,00	P (4)	ZONE	IING O.O ppm		ASING SECU	
PROTECTIVE X 1.68 gal/ft (4"well) =	HEIGHT OF	J [_] 7 WELL	WELL	O.O ppm		PRESENT	
PURGE DATA VOLUME #		DIAMETER = _	PROTEC				
CLEAR CLEAR CLEAR CLEAR TURBID COLORED COL	Dx 1.68 gal/ft (4" Well) Dx gal/ft (Well)	= 19,7		ROUND 2,3	ſ		0.2, 1
TEMPERATURE, deg. C pH units 5.96 (.01 6.02 6.07 6.02 SPECIFIC CONDUCTIVITY, unho/cm 1.29 (.25 0.24 0.24 0.24) SPECIFIC CONDUCTIVITY, unho/cm 1.00 0 0 SAMPLE PARAMETERS COLLECTED METHOD # FRACTION CODE PRESERATIVE VOLUME SAMPLE BOTTLE NUMBER SVOCS UM19 EC 4C 2-1L AG A B CONTROL # 105 VOC UM20 VP HCL,4C 4-40 mt AG E F G H HN03 pH<2 1-1L Poly INORGANICS-UNFILTERED WATER QUALITY PARAM. TOS 160.1 S H2504 pH<2 1-1L Poly TPHC 418.1 C H2504 pH<2 2-1L AG M N NUMBER OF IN-LINE FLOAT ACTIVATED OTHER OCCURRENCE INCLINE FLOAT ACTIVATED OTHER OTHER INCLINE FLOAT ACTIVATED OTHER OCOR OTHER (SEE NOTES) OTHER OTHER (SEE NOTES) OTHER OTHER SAMPLING EQUIPMENT PURGING SAMPLING DEDICATED SUBMIRSABLE PUMP (WHALE) DEDICATED TEFLON BAILER IN-LINE FILTERS USED: INCLINE FILTER (INORGANICS) OTHER OTHER OCCURRED OTHER OTHER OCOR OTHER (SEE NOTES) OTHER OTHER OTHER OTHER OTHER OTHER OCOR OTHER OTHER OTHER OTHER OCOR OTHER OTHER OTHER OCOR OTHER OTHER OTHER OTHER OTHER OCOR OTHER (SEE NOTES) OTHER OTHER OTHER OTHER OTHER OTHER OTHER OTHER OTHER OTHER OTHER OCOR OTHER OTHER OTHER OTHER OTHER OTHER OCOR OTHER OTH	PURGE DATA VOLUM	E # INITIAL LI	1.50 (12.06)	3 (12:23) 4 (12:48) 5			SAMPLE OBSERVATION
PH UNITES SPECIFIC CONDUCTIVITY, Umho/cm TURBIDITY' ntu REDOX (AT COMPLETION OF PURGING) MINUTERION CAT COMPLETION OF PURGING) MINUTERION CAT COMPLETION OF PURGING) MINUTERION CAT COMPLETION OF PURGING) MINUTERION CAT COMPLETION OF PURGING) MINUTERION CAT COMPLETION OF PURGING) MINUTERION CAT COMPLETION OF PURGING) MINUTERION CAT COMPLETION OF PURGING) MINUTERION CAT COMPLETION OF PURGING) MINUTERION CAT COMPLETION OF PURGING) MINUTERION CAT COMPLETION OF PURGING) MINUTERION CAT COMPLETION OF PURGING COLLECTED MINUTERION CAT COMPLETION OF PURGING COLLECTED MINUTERION CAT COLLECTED MINUTERION CAT COLLECTED MINUTERION CAT COLLECTED MINUTERION CAT COLLECTED MINUTERION CAT COLLECTED MINUTERION CAT COLLECTED MINUTERION CAT COLLECTED MINUTERION CAT COLLECTED MINUTERION CAT COLLECTED MINUTERION CAT COLLECTED MINUTERION CAT COLLECTED MINUTERION CAT COLLECTED MINUTERION CAT COLLECTED MINUTERION CAT COLLECTED MINUTERION CAT COLLECTED MINUTERION CAT COLLECTED MINUTERION CAT COLLECTED MINUTERION CAT CAT COLLECTED MINUTERION CAT CAT CAT CAT CAT CAT CAT CAT CAT CAT	GALLO	NS 0 1	1.7 29.4	44.1 58.8 7	3.5		CLEAR
SAMPLE PARAMETERS COLLECTED METHOD # FRACTION CODE PRESERATIVE SOUCS UN18 MS 4C 2-1L AG A B CONTROL # LUND PEST./PCBS UN19 EC 4C 2-1L AG C D (DUp: YV8) VOC UN20 VP HCL,4C 4-40 mL AG E F G H INORGANICS-UNFILTERED WATER QUALITY PARAM. 160.1 S H2SO4 pH<2 1-1L Poly I THIC 418.1 C H2SO4 pH<2 2-1L AG M N N SAMPLING EQUIPMENT WATER LEVEL EQUIPMENT USED: PELECTRIC CONDUCTIVITY PROBE FLOAT ACTIVATED OTHER (SEE NOTES) OTHER OTH	TEMPERATURE, deg. C	13.8 13	3 9 13.9	13.9 13.9			TURBID
TURBIDITY' ntu	pH units	5.96 1	.01 6.02	6.02 6.02			COLORED
SAMPLE PARAMETERS COLLECTED METHOD # FRACTION CODE PRESERTIVE VOLUME SAMPLE BOTTLE NUMBER SVOCS UM18 MS 4C 2-1L AG A B CONTROL # 165 PEST./PCBS UW19 EC 4C 2-1L AG C D (DUP: YYS) VOC UM20 VP HCL,4C 4-40 ml AG E F G H INORGANICS-UNFILTERED * NF HNO3 pH<2 1-1L Poly I INORGANICS-FILTERED * NF HNO3 pH<2 1-1L Poly J IF MS/MSD COLLECTED MATER QUALITY PARAM. * C 4C 1-1L Poly L I IF DUPLICATE TPHC 418.1 C H2SO4 pH<2 2-1L AG M N SAMPLING EQUIPMENT USED: ELECTRIC COMDUCTIVITY PROBE FLOAT ACTIVATED OTHER NOTHER NOTHER NOTHER NOTHER NUMBER OF IN-LINE FILTER (INORGANICS) OTHER	SPECIFIC CONDUCTIVITY, umho	/cm (2.259 C.	254 0,260	0.260 0.26			ODOR
SAMPLE PARAMETERS COLLECTED METHOD # FRACTION CODE SYDCS UM18 MS 4C 2-1L AG A B CONTROL # LSS PEST./PCBS VOC UM20 VP HCL,4C 4-40 ml AG E F G H INORGANICS-UNFILTERED * NF HN03 pH<2 1-1L Poly I INORGANICS-FILTERED * NF HN03 pH<2 1-1L Poly J WATER QUALITY PARAM. ** TOS SAMPLING EQUIPMENT WATER LEVEL EQUIPMENT USED: ELECTRIC CONDUCTIVITY PROBE FLOAT ACTIVATED OTHER OTHER NOTES: * PAL inorganics: ICP metals (SS10), AS (SD21), SE (SD21), TL (SD09), SB (SD26), PB (SD20), HG (SB01). Water Quality Parameters: PO4 (TF27), TKN (TF26), NIT (TF22), CL/SO4 (T110), TSS (160-2), ALK (301-0), HARDNESS.	TURBIDITY' ntu		0 0	0 0			
SVOCS PEST./PCBS UM19 EC 4C 2-1L AG A B CONTROL # US PEST./PCBS UM19 EC 4C 2-1L AG C D (D Up: YV8) VOC UM20 UM20 VP HCL,4C 4-40 ml AG E F G H INORGANICS-UNFILTERED * NF HN03 pH<2 1-1L Poly INATER QUALITY PARAM. * C 4C 1-1L Poly INTERED WATER QUALITY PARAM. * C 4C 1-1L Poly K IF MINOS PH<2 IF MINOS PH<2 COLLECTED TPHC 418.1 C H2SO4 pH<2 1-1L Poly K COLLECTED TPHC 418.1 C H2SO4 pH<2 1-1L Poly COLLECTED M N N N SAMPLING DEDICATED SUBMIRSABLE PUMP (WHALE) DEDICATED TEFLON BAILER IN-LINE FILTER (INORGANICS) OTHER NOTHER	REDOX (AT COMPLETION OF PUR	31NG) (MV) 29	1.5	····	<u> </u>		
SVOCS PEST./PCBS UM19 EC 4C 2-1L AG A B CONTROL # US PEST./PCBS UM19 EC 4C 2-1L AG C D (D Up: YVS) VOC UM20 VP HCL,4C 4-40 ml AG E F G H INORGANICS-UNFILTERED * NF HN03 pH<2 1-1L Poly INORGANICS-FILTERED WATER QUALITY PARAM. * C 4C 1-1L Poly IF MS/MSD COLLECTED TPHC 418.1 C H2S04 pH<2 1-1L Poly L IF DUPLICATE COLLECTED TPHC 418.1 C H2S04 pH<2 2-1L AG M N NUMBER OF IN-LINE FILTERS USED: DEDICATED TEFLON BAILER IN-LINE FILTER (INORGANICS) OTHER NOTES: * PAL inorganics: ICP metals (SS10), AS (SD21), SE (SD21), TL (SD09), SB (SD28), PB (SD20), HG (SB01), Water Quality Parameters: PO4 (TF27), TKN (TF26), NIT (TF22), CL/SO4 (TT10), TSS (160.2), ALK (301.0), HARDNESS.							
PEST./PCBS UM19 EC 4C 2-1LAG C D DUP: W8 VOC INORGANICS-UNFILTERED * N HN03 pH<2 1-1L Poly INORGANICS-FILTERED * NF HN03 pH<2 1-1L Poly UM20 * NF HN03 pH<2 1-1L Poly UM20 * NF HN03 pH<2 1-1L Poly UM20 * NF HN03 pH<2 1-1L Poly UM20 * NF HN03 pH<2 1-1L Poly UM20 * NF HN03 pH<2 1-1L Poly UM20 * NF HN03 pH<2 1-1L Poly UM20 * NF HN03 pH<2 1-1L Poly UM20 * NF HANO3 pH<2 1-1L Poly UM20 * NOULECTED UM20 * NOULECTED UM20 * NOULECTED * NUMBER OF IN-LINE FILTERS USED: * DEDICATED SUBMIRSABLE PUMP (WHALE) DEDICATED TEFLON BAILER IN-LINE FILTER (INORGANICS) OTHER * NOTHER * NOTHER * NOTHER * NOTHER * NOTHER * NOTHER * NUMBER OF IN-LINE FILTERS USED: * OTHER * NUMBER OF IN-LINE FILTERS USED: * OTHER * NUMBER OF IN-LINE * IN-LINE FILTER (INORGANICS) OTHER * NUMBER OF IN-LINE * IN-LINE FILTER (INORGANICS) OTHER * NUMBER OF IN-LINE * FILTERS USED: * OTHER * NUMBER OF IN-LINE * FILTERS USED: * OTHER * NOTHER * NOTHER * NOTHER * NF HN03 pH<2 1-1L POLY INORGANICS- * NOTHER * NF HN03 pH<2 1-1L POLY INORGANICS- IF MS/MSD COLLECTED * NUMBER OF IN-LINE FILTERS USED: * OTHER * NF * NF HN04 PM * NOTHER * NF HN05 pH * OTHER * NF HN05 pH * OTHER * NF HN06 pH * OTHER * NF HN07 pH * OTHER * NF HN08 pH * OTHER * NF HN08 pH * OTHER * NF HN08 pH * OTHER * NF HN08 pH * OTHER * NF HN08 pH * OTHER * NF HN08 pH * OTHER * NF HN08 pH * OTHER * NF HN08 pH * OTHER * NF HN08 pH * OTHER * NF HN08 pH * OTHER * NF HN09 pH * OTHER * NF HN09 pH * OTHER * NF HN09 pH * OTHER * NF HN09 pH * OTHER * OTHER	SAMPLE PARAMETERS COLL	ECTED METHOD #	FRACTION CODE	PRESERATIVE	VOLUME	SAMPLE BOT	
VOC INORGANICS-UNFILTERED * N HN03 pH<2 1- 1L Poly I INORGANICS-FILTERED * NF HN03 pH<2 1- 1L Poly J GOLLECTED WATER QUALITY PARAM. * C 4C 1- 1L Poly K IF MS/MSD COLLECTED TPHC 418.1 C H2S04 pH<2 1- 1L Poly L FILTERS USED: SAMPLING EQUIPMENT WATER LEVEL EQUIPMENT USED: ELECTRIC CONDUCTIVITY PROBE FLOAT ACTIVATED OTHER POPURING SAMPLING OTHER NUMBER OF IN-LINE FILTERS USED: NUMBER OF IN-LINE FILTERS USED: OTHER NUMBER OF IN-LINE FILTERS USED: OTHER NUMBER OF IN-LINE FILTERS USED: OTHER NUMBER OF IN-LINE FILTERS USED: NUMBER OF IN-LINE FILTERS US	svocs	UM18	MS	4C	2- 1L AG	A B	
INORGANICS-UNFILTERED INORGANICS-FILTERED INORGAN	PEST./PCBS	UW19	EC	4C	2- 1L AG	C D	(Dup: 448)
INORGANICS-FILTERED WATER QUALITY PARAM. * NF HN03 pH<2 1- 1L Poly J IF MS/MSD COLLECTED WATER QUALITY PARAM. * C 4C 1- 1L Poly K IF DUPLICATE COLLECTED TPHC 418.1 C H2S04 pH<2 2- 1L AG M N NUMBER OF IN-LINE FILTERS USED: * PAL inorganics: ICP metals (SS10), AS (SD21), SE (SD21), TL (SD09), SB (SD28), PB (SD20), HG (SB01). Water Quality Parameters: P04 (TF27), TKN (TF26), NIT (TF22), CL/S04 (TT10), TSS (160.2), ALK (301.0), HARDNESS.	voc	UM20	VP	HCL,4C	4- 40 ml AG	E F	G H
WATER QUALITY PARAM. * C 4C 1-1L Poly K 160.1 S H2S04 pH<2 1-1L Poly L TPHC 418.1 C H2S04 pH<2 2-1L AG M N SAMPLING EQUIPMENT WATER LEVEL EQUIPMENT USED: ELECTRIC CONDUCTIVITY PROBE FLOAT ACTIVATED OTHER DEDICATED SUBMIRSABLE PUMP (WHALE) IN-LINE FILTER (INORGANICS) OTHER OTHER Actes: * PAL inorganics: ICP metals (SS10), AS (SD21), SE (SD21), TL (SD09), SB (SD28), PB (SD20), HG (SB01). Water Quality Parameters: P04 (TF27), TKN (TF26), NIT (TF22), CL/S04 (TT10), TSS (160.2), ALK (301.0), HARDNESS.	INORGANICS-UNFILTERED	*	N	HNO3 pH<2	1- 1L Poly		
WATER QUALITY PARAM. Total	INORGANICS-FILTERED	*	NF	HNO3 pH<2	1- 1L Poly	J	
TPHC 418.1 C H2SO4 pH<2 1- 1L Poly L COLLECTED M N N SAMPLING EQUIPMENT WATER LEVEL EQUIPMENT USED: ELECTRIC CONDUCTIVITY PROBE FLOAT ACTIVATED OTHER Notes: * PAL inorganics: ICP metals (SS10), AS (SD21), SE (SD21), TL (SD09), SB (SD28), PB (SD20), HG (SB01). Water Quality Parameters: PO4 (TF27), TKN (TF26), NIT (TF22), CL/SO4 (TT10), TSS (160.2), ALK (301.0), HARDNESS.		, * 160.1	С	4C	1- 1L Poly	K	
SAMPLING EQUIPMENT PURGING SAMPLING DEDICATED SUBMIRSABLE PUMP (WHALE) DEDICATED SUBMIRSABLE PUMP (WHALE) DEDICATED TEFLON BAILER IN-LINE FILTER (INORGANICS) OTHER		/	S	H2SO4 pH<2	1- 1L Poly	L	
WATER LEVEL EQUIPMENT USED: DEDICATED SUBMIRSABLE PUMP (WHALE)	трнс	418.1	С	H2SO4 pH<2	2- 1L AG	M. N	
WATER LEVEL EQUIPMENT USED: DEDICATED SUBMIRSABLE PUMP (WHALE)	·		· · · · · · · · · · · · · · · · · · ·				
ELECTRIC CONDUCTIVITY PROBE FLOAT ACTIVATED OTHER Notes: * PAL inorganics: ICP metals (SS10), AS (SD21), SE (SD21), TL (SD09), SB (SD28), PB (SD20), HG (SB01). Water Quality Parameters: P04 (TF27), TKN (TF26), NIT (TF22), CL/S04 (TT10), TSS (160.2), ALK (301.0), HARDNESS.	SAMPLING EQUIPMENT	ş	PURGING SAMPLI	1		FI	• • • • • • • • • • • • • • • • • • •
FLOAT ACTIVATED OTHER OTHER OTHER OTHER IN-LINE FILTER (INORGANICS) OTHER OTHER OTHER OTHER OTHER Mater Quality Parameters: P04 (TF27), TKN (TF26), NIT (TF22), CL/S04 (TT10), TSS (160.2), ALK (301.0), HARDNESS.			X X	DEDICATED SUBMIRS	ABLE PUMP (WHALE)	
OTHER OTHER	ELECTRIC CONDUCTIVITY F	ROBE		DEDICATED TEFLON	BAILER		
Notes: * PAL inorganics: ICP metals (SS10), AS (SD21), SE (SD21), TL (SD09), SB (SD28), PB (SD20), HG (SB01). Water Quality Parameters: P04 (TF27), TKN (TF26), NIT (TF22), CL/SO4 (TT10), TSS (160.2), ALK (301.0), HARDNESS.	FLOAT ACTIVATED			IN-LINE FILTER (I	NORGANICS)		
Water Quality Parameters: PO4 (TF27), TKN (TF26), NIT (TF22), CL/SO4 (TT10), TSS (160.2), ALK (301.0), HARDNESS.	OTHER			OTHER		· · · · · · · · · · · · · · · · · · ·	
Water Quality Parameters: PO4 (TF27), TKN (TF26), NIT (TF22), CL/SO4 (TT10), TSS (160.2), ALK (301.0), HARDNESS.							
SAMPLERS SIGNATURE July & Mytomery							
SAMPLERS SIGNATURE WITH S. Mytomery					•	•	
SAMPLERS SIGNATURE WITH S. 1 / Momeny						1/1 -	-
			SAMPL	ERS SIGNATURE	ran S. 1	V /M/	somery
					7	17	

ABB ENVIRONMENTAL SERVICES, INC.		-	ILE TYPE CGW	7		100 [04// 00]
FIELD DATA RECORD - GROUNDWA	ATER	r	ILE TYPE CGW	SITE TYPE	WELL	NUMBER 9144-02
PROJECT USAEC-FT. DEVENS	HEATHER _ CLICAN,	windy,	10°5	LOCATION STAR	T 1145	END 1330
SITE 10 57M-95-0	SAMPLE M	D570	1X2 DATE	2/13/96	STUDY AI	REA SA 57
WATER LEVEL / WELL DATA ME/	ASURED FROM	PID HEADSP	ACE READINGS	WELL INTEGR	ITY	YES NO
WELL DEPTR FT	TOP OF WELL	BREATHING ZONE	ppm	PROTECTIVE	CASING SECU	RE
WATER DEPTH FT	TOP OF CASING	WELL	mqq	WELL LOCKED		
1	ELL TAMETER =	HEAD		PVC WELL CA	PRESENT	
x 1.68 gal/ft (4" well) =	GAL/VOL	PROTECTIVE CASING STIE	CK-UP		ECTIVE INGE/WELL	FT
x gal/ft (well)		FROM GROUND			FERENCE	
PURGE DATA VOLUME #					3	SAMPLE OBSERVATION
GALLONS			\downarrow			CLEAR
TEMPERATURE, deg. C		- A-				TURBID
pH units		121,				COLORED
SPECIFIC CONDUCTIVITY, umho/cm						ODOR
TURBIDITY						OTHER (SEE NOTES)
REDOX (AT COMPLETION OF PURGING)					···	
SAMPLE PARAMETERS COLLECTED			PRESERATIVE 4C	VOLUME		TLE NUMBER CONTROL #455
SVOCS PEST./PCBS	UM18 MS		4C 4C	2- 1L AG 2- 1L AG	A B	
voc	UM20 VP		HCL,4C	4- 40 mt AG		
INORGANICS-UNFILTERED	* N		HN03 pH<2	1- 1L Poly		
INORGANICS-FILTERED	. * NF		HN03 pH<2	1- 1L Poly		IF MS/MSD
WATER QUALITY PARAM.	* C		4C	1- 1L Poly		COLLECTED
/ TDS	160.1 S		H2SO4 pH<2	1- 1L Poly		IF DUPLICATE COLLECTED
ТРНС	418.1 C		H2SO4 pH<2	1- 1L Poly	<u></u>	
			•			
SAMPLING EQUIPMENT	PURGING	SAMPLING				MBER OF IN-LINE
WATER LEVEL EQUIPMENT USED:			EDICATED SUBMIRS	SABLE PUMP (WHAL		LTERS USED:
ELECTRIC CONDUCTIVITY PROBE			EDICATED TEFLON	BAILER		
FLOAT ACTIVATED			N-LINE FILTER ((NORGANICS)		
OTHER		and o	THER			
Notes: * PAL inorganics: ICP meta	le (SS10) AS (SD21		TI (CD00) CD	(cn38) BB (cn3	HC (SPO	1
Water Quality Parameters:	PO4 (TF27), TKN (TF26), NIT (TF22), CL/SO4 (1	TT10), TSS (160.	2), ALK (30	1.0), HARDNESS.
Field dup	licate for	57M-	95-01X			
•				_		\sim
		SAMPLERS	SIGNATURE	Nancy	E.R	ota/SM
<u> </u>						

	LD SAMPLE DATA RECORD
roject: USATHAMA - Fort Devens roject Number: 9144.02	Study Area: SA 57
	Date:2 12 46
ample Location ID: 57M-95-01X ime: Start: 1145 End: 3300 13	Signature of Sampler: MR/SM
The state of the s	200 aignature of parubier: 14K/2iv/
	Protective (from ground) Casing/Well Difference
Casing	Protective 2.1 Ft. Casing
Depth to Water 23.07 Ft Wey Material: Wey Locked? PVC Yes SS No	?: Well Dia.
Height of Water Column X	Gal/Vol Weil Integrity: Yes No Prot. Casing Secure Concrete Coilar Intact Other
Purging/Sampling Equipment Used:	Decontamination Fluids Used:
(✓ If Used For) Purging Sampling Equipment	ID (/ All That Apply at Location)
Pensialtic Pump	Methanoi (100%)
Barier	25% Methanol/75% ASTM Type II water Delonized Water
PVC'Silicon Tubing Teflor/Silicon Tubing	Liquinox Sοιμεση Hexane
Airiit	HNO ₃ /D.I. Water Solution
Hand Pump In-line Filter	
Hand Pump In-line Filter Press Vac Filter Whate pump	
<u> </u>	Sample Observations: mitical did Data Collected In-line Turbid Clear Cloudy TUY bid In Container Colored Odor
Purge Data @ 14 Gai. @ 28	
Temperature, Deg. C 10.4	9 11.8 11.9 11.6 MAZ
pH, units 5, 5 5. Specific Conductivity 105 107	5.5
(umhos/cm. @ 25 Deg. C.)	
Oxidation - Reduction, +/- mv Dissolved Oxygen, ppm 7,0 7.	9 7.5 7.8 2.5 7.9
whate (otas)	7
nalytical Parameter If Field Preservation Volume Filtered Method Require	ne / If Sample Sample Bottle IDs (15%)
VOA HCL 4040 ml	E F G H
SVOA 40C 2- liter Al Pest/PCB 40C 1-1 liter A	$\begin{array}{cccccccccccccccccccccccccccccccccccc$
organics HNO, 3-1 liter	P Z THE T
Explosives	AG V N', N',
TOC H ₂ SO ₄ 1-2 liter	P
Trate H ₂ SO ₄ 1-2 liter	
	— V tho K L
	The state of the s
	-

- Purge H20 headspace = 0.0 gmy - Field duplicate collected at this location for all paramis (control # 455)

ABB Environmental Services, Inc.

9202159D (j)

pject: <u>USATHAMA - F</u> pject Number: mple Location ID:	9144.02		Study Area:	SA 57		~-
			Data:	HARM ISIN	<u> </u>	
CHOIM LOCATION (II)	57M-95-02	X	Date:	13/9	b	
ne: Start: 1415	End:	1530	Signature of Sam	pler: MR/S	M	
Weil Depth <u>26.5</u> Ft	Measured Historical	Top of Well Top of Protective Casing	Well Riser Stick-up (from ground)	Casi	ective 2.4±FL	
Depth to Water 17.57 Ft	Wei/Material:SS	Well Locked?: Yes No	V4 inc	h Wate	r Level Equip. Used: Elect. Cond. Probe Float Activated	(taken ?
Height of Water Column		75	Prot. Ca	ising Secure	Yes No	
	Sampling Equipment Use	<u>d</u> :		<u>Decontamination</u>	Fluids Used:	
(If Used For) Purging Sampling	Pensaltic Pump Submersible Pump Bailer PVC/Silicon Tubing Teflor/Silicon Tubing Airlit Hand Pump In-line Filter Press/Vac Filter Whale pump	Equipment ID	(✔ A	Methanoi (100° 25% Methanoi/ Deionized Wati Liduinox Solutio Hexane	%) 75% ASTM Type II w er on	rater
		<i></i>	In Contai	Turbid ner Colored	ClearCloud Odor	·75
Temperature, Deg. C pH. units Specific Conductivity (umhos/cm. @ 25 Deg	8.8 5.9 160	il,0 5.4	1. @ <u>50</u> Gal. 11. 5.6 12.6	@ <u>-15</u> Gal. 	11.6. 5.6. 128	11.6
		7.8	9.3	7.0	9/1	8.4
Turbidity !	(ntus) 49	C	0		0	o
		Volume Required	✓ If Sample Collected	Sample Bottle II	os (170)	
VOA SVOA Pest/PC8 rganics Explosives TPH TOC rate Notes:	HCL 40C 40C HN0, 4°C H,S0, H,S0, H ₂ S0,	4040 ml 2- liter AG 1-1 liter AG 3- 1 liter P 2- 1 liter AG 2- 1 liter AG 1- 2 liter P 1- 2 liter P	√ √ √ √ √ √ √ √ √ √ √ √ √ √			- * * * * * * * * * * * * * * * * * * *
	Weil Depth 26.5 Fit Depth to Water 17.51 Fit Height of Water Column Column	Weil Depth 26.5 Ft	Weil Depth 26.5 Ft. Measured	Weil Depth 26.5 Ft	Weil Depth 26.5 FL Measured Historical Top of Weil Casing Measured Historical Top of Protective (from ground) Measured Historical Top of Protective (from ground) Top of Protective Casing Pro	Weil Depth 36.5 Ft. Measured Historical Top of Protective Casing Ground Casing Ca

92021590 (j)

ABB Environmental Services, Inc.

ABB ENVIRONMENTAL SERVICES, INC.							
FIELD DATA RECORD - GROUNDWA	ATER	FILE T	YPE CGW S	SITE TYPE WELL	JOB 9144-02 NUMBER		
PROJECT USAEC-FT. DEVENS	WEATHER Snow	J. 20°5,		ATION START	END 1300		
SITE ID 57M-95-0	SAMPLE NUMBER	D57037	K 2 DATE		Y AREA SA 57		
WATER LEVEL / WELL DATA MEA	ASURED FROM	PID HEADSPACE R	EADINGS W	ELL INTEGRITY	YES NO		
WELL DEPTH FT	TOP OF WELL	BREATHING	ppm P	PROTECTIVE CASING S	ECURE		
WATER DEPTH FT	TOP OF CASING	ZONE	ppm	WELL LOCKED			
	ELL IAMETER =	PROTECTIVE		POTECTIVE			
x 1.68 gal/ft (4" well) = x gal/ft (well)	GAL/VOL	CASING STICK-UP	FT	POTECTIVE CASINGE/WELL DIFFERENCE	L FT		
PURGE DATA VOLUME #		M			SAMPLE OBSERVATION		
GALLONS		'			CLEAR		
TEMPERATURE, deg. C					TURBID		
pH units					COLORED		
SPECIFIC CONDUCTIVITY, umho/cm					ODOR		
TURBIDITY' ntu					OTHER (SEE NOTES)		
REDOX (AT COMPLETION OF PURGING)	·				(322 NO123)		
SAMPLE PARAMETERS COLLECTED					BOTTLE NUMBER B CONTROL # 458		
svocs	UM18 : MS		_	1L AG A			
PEST./PCBS	UW19 EC			1L AG C			
VOC INORGANICS-UNFILTERED	UM20 · VF		•	40 ml AG E	F G H		
	~ NF		·		☐ IF MS/MSD		
INORGANICS-FILTERED WATER QUALITY PARAM.	* · C		NO3 pH<2 1-	1L Poly J 1L Poly K	COLLECTED		
/ TDS	160.1		•	1L Poly L	IF DUPLICATE COLLECTED		
TPHC V	418.1 C		2S04 pH<2 1-		N		
	410.1		2304 pii 12				
SAMPLING EQUIPMENT	PURGING	SAMPLING			NUMBER OF IN-LINE		
WATER LEVEL EQUIPMENT USED:	~		ATED SUBMIRSABLE	PUMP (WHALE)	FILTERS USED:		
ELECTRIC CONDUCTIVITY PROBE	H	DEDIG	NEE HEFLON BAH	ER			
FLOAT ACTIVATED	H^	<u> </u>	FILTER (INORG				
OTHER		OTHER	_				
Notes: * PAL inorganics: ICP metals (\$\$10), AS (\$D21), SE (\$D21), TL (\$D09), SB (\$D28), PB (\$D20), HG (\$B01). Water Quality Parameters: PO4 (TF27), TKN (TF26), NIT (TF22), CL/SO4 (TT10), TSS (160.2), ALK (301.0), HARDNESS.							
Duplicated	of 57m-	95-03x (MX57037	X2)			
			, N	_ ^	Dis		
·		SAMPLERS SIGNA	ATURE \/\OJ	may E. R	Tra/ 1		

		A 9000 A A A A				ANDR	SEIBID				13(8)						
	oject: <u>US</u>		1A - POI	TUEVENS	<u> </u>				tudy Are		SA	57		<u>. </u>		٠.	
	oject Num			144.0		2~		. D	ate:	1	1419	6					
	mple Loca ne: Start:		: 1110	57M-	15 - U. End:		: 00	_	Signatur	of San	npler:	M	2/J	J			
	Well Dep	m <u>19</u> .	<u>5</u> FL		esured torical		Top of Well Top of Prote Casing			r Stick-up una)	2.0) FL	Casin	g/Well D),37 _{FL})ifference ,4± _{FL}		
	Depth to !	Water 9	.13 _{Ft}	Wei/Mar SS	C	Well	Locked?: Yes No		Well Dia	2 inc 4 inc 6 inc	ch	(M)	Casin Water	g Level Ed lect. Cor loat Acti	quip. Used nd. Probe vated	:: (tal	čen
	Height of \	war-so 9.77	lumn X _Ft	65 G	avft (2 in avft (4 in avft (6 in avft (4 in) =	C	L Gai/Vo Total G	ni al Purg ed	Weil In Prot. C Concre Other	asing S te Coll		ヹ ゚ -	Yes	nsducer phase No	indu orebe	cat
-		Pu	urging/Sa	impling Eq	uipment (Jsad:					Dec	ontamin	ation F	luids U	sed:		
	(√ Purg	if Used F ing Sar	for) Inpling	Pensaltic		Ec	uipment ID			(1		: Apply a fethanol					
	-	- T	7	Submersii							2	5% Met	anol/7	5% ASTI	M Type II	water	
	-			Barier PVC'Silico	n Tubing							eionized iguinox (
	- - - - 7			Teflor/Sili	con Tubing	_					=	iexane			_		
	-	<i>-</i> -	<u>-</u>	Airlift Hand Purt	1p							INO3/D.I		Solution	1		
		¥	-	In-line Filt								lone				~	_
	,	4 3	£	Press/Vac		· -									-	\mathcal{O}	1
				 													
	Ambient	t Air VOC	bkg	_ppm We	HI Mouth E	Ka pp	m Field D	ata Col	ected	(In-line	•	ampie O	•	Clear	Clou	gy Band	
		Purge	Data	@_	0	Gai.	@_16	_Gal.	<u>.</u> g_32	in Conta		Color Color	eo y Gai. @		(old Gai.	1)
	Temr	perature, [Den C	-	6.1		7.4		مک			<u>(1 > </u>		<u></u>	.4	ĺ .	
	pH.u	nits			4.76		3.		_ <u></u>			19		5		6	Ç9
		ific Condu os/cm. @		C.) —	<u>८</u>		2/		-84			34		42		ايرن ا	1
	Cxica	ttion - Rec	luction, +	/- mv												7	9
	<u> </u>	ived Oxyg	laur bbw		5.20				_4.	72_		<u> </u>	4 -	5-	24		7.5
_		ינ ף			claw.	34.	219	uky	(3			10 .	4	(, (3	50 G / .	ء کـــــ	G y
Aı	nalytical Para	ameter	✓ If Field		Preservati Method		Volume Required		' If Sample Collected	•	S	ample Bo	ide ID:	٠ ﴿ أَ	12		
	VOA			_	HCL		4040 ml		V		-	١ ا	_ ;;	, 6	3 /	f t	
	SVOA Pesi/PC3				40C 40C		2- liter AG		Ĭ,		_	#	13	/ 			•
Inc	organics		<u> </u>	_ 1	HNO,		1-1 liter AG 3- 1 liter P		Ž		_	<u>`</u>	4	所厂			
	Explosives TPH				4°C H,S0,		2- 1 liter AG 2- 1 liter AG		7		_	N .	<u> </u>	_/_	<u></u> ',-		
. pr -	TOC			_ 1	H,SO,		1- 2 liter P		<u>-</u>	•		<u>'</u> ,		<u>-;</u>			
MI	trate Notes:	Ha	d to	1	મુંડળ, (૧૮૧૨		1-2 liter P							′			
		CU	vou	ldn	Ha	<u> </u>			√ .	HiQ Qel	ગ્રી	K .	L	7 . ≟ 1	<u>.</u>		
																_	
12	1590 (j)			_				-		AR	R E-	viron	nent	al Sar	vices.	inc	

- Ruge HzO headspace = initial = bkg: dumped voi. 1. Then
- Field duplicate collected for the all parameters smelled fuel odor.
- Recharge Slight W Slower Har parameter was proper to the first parameter of

Pro	ojea: USATHAMA - Fo	rt Devens		Study Area:	TA RECORD SA 57	•	
	oject Number: 9	144.02		Date:	214196		
	mple Location ID:	67M-95-04A	0945	Signature o	f Sampler:	NR/3.1	
	Well Depth <u>13.2</u> FL	Measured Historical	Top of Weil Top of Protective Casing		tick-up <u>0,80</u> FL)	Protective <u>-0,40</u> Ft. Casing/Well Difference Protective <u>i,2+</u> Ft.	
	Depth to Water 2.75FL	Wey Material: PVC SS	Well/Locked?: No	Well Dia.	2 inch 4 inch 6 inch	Water Level Equip. UsedElect. Cond. ProbeFloat ActivatedPress. TransducerORS_phase	
	Height of Water Column)		146	Cal Burned (Weil Integrity: Prot. Casing Secure Concrete Collar Intac Other	Yes No	. II XC
	Purging/S	ampling Equipment Use	od:		Decontami	nation Fluids Used:	-
	(If Used For) Purging Sampling	Pensaltic Pump Submersible Pump Bailer PVC/Silicon Tubing Teffor/Silicon Tubing Airlith Hand Pump In-line Filter Press/Vac Filter Whall pump	Equipment ID		Delonize Liquinox Hexane	ii (100%) thanol/75% ASTM Type II v d Water Solution .I. Water Solution	vate:
	Ambient Air VOC DKC	ppm Well Mouth b	ppm Field Data C		lineTurb ContainerColo		٠
	Purge Data Temperature, Deg. C pH. units Specific Conductivity (umhos/cm. @ 25 Deg. Oxidation - Reduction, Dissolved Oxygen, ppn	6.: 5.0; 0.0% 	Gai. @ 46 Gal	8.3 5.00 9.2	Sal. @ 54 8.2 3.2 86.	Gal. @ 72 Gal. 9.0 5.03 98	7.9 3.03 84 2.
		70 3 10	10		10	10	
An	alytical Parameter / If Fid		Volume Required	✓ If Sample Collected	Sample 5	Bottle IDs (174)	15
lno	VOA SVOA Pest/PCB rganics Explosives TPH TOC rate Notes:	HCL 40C 40C HN0, 4°C H,50, H,50,	4040 ml 2- liter AG 1-1 liter AG 3-1 liter P 2-1 liter AG 2-1 liter AG 1-2 liter P 1-2 liter P	L Z KKK	· K		

9202159D (j)

ABB Environmental Services, Inc.

ABB ENVIRONMENTAL SERVICES, IN	c.	FILE 1	YPE CGW SI	TE_TYPE WELL	JOB 9144-02
FIELD DATA RECORD - GROUN			<u> </u>		NUMBER
PROJECT USAEC-FT. DEVENS	WEATHER	rast, snow i	LOCAT ACTIV	1	O END 10:30
SITE 10 \$ 7M 95 [048 SAMPLE NUMBER	1 1 5 7 0 4 8	32 DATE 2	1496 STUDY	SA 57
WATER LEVEL / WELL DATA	MEASURED FROM	PID HEADSPACE R	EADINGS WE	LL INTEGRITY	YEŞ NO
WELL DEPTH 31.0 = FT	TOP OF WELL	BREATHING bk	ppm PR	OTECTIVE CASING SE	CURE
WATER DEPTH 3.56 FT	TOP OF CASING	[LL LOCKED	$\nabla \cdot \Box$
HEIGHT OF WATER COLUMN 27.44 FT	WELL DIAMETER = 4"	HEAD DK	C ppm PV	C WELL CAP PRESENT	
x 1.68 gal/ft (4" well) = gal/ft (well)		PROTECTIVE CASING STICK-UP FROM GROUND	2.1± FT	POTECTIVE CASINGE/WELL DIFFERENCE	-0.17 FT
PURGE DATA VOLUME #		2 3	4 5		SAMPLE OBSERVATION
GALLONS	0 46	92 138	184 230		CLEAR
TEMPERATURE, deg. C	5.9 11	11 10.6	10.7 11.0		TURBID
pH units	4.6 4.9	5.02 5.1	5.0 4.9		COLORED
SPECIFIC CONDUCTIVITY, umho/cm		266 263	257 254		ODOR
TURBIDITY' ntu	10 10	10 10	10 10	·	OTHER
REDOX (AT COMPLETION OF PURGIN	G)			OBP	= 198
Juno di La (all's)	10.0 8.7	8.6 3.8	8.8 8.95	,	
SAMPLE PARAMETERS COLLECTI	•	•			BOTTLE NUMBER
svocs	UM18 (4 S 4	c 2-	1L AG A	в сонткоц # <u>45</u> 9
PEST./PCBS	UW19 !	EC 4	c 2-	1L AG C	0
voc	UM20 '	VP H	CL,4C 4-	40 m LAGE	F G H
INORGANICS-UNFILTERED	* !	N H	NO3 pH<2 1-	1L Poly I	
INORGANICS-FILTERED	* !	NF H	NO3 pH<2 1-	1L Poly J	IF MS/MSD
WATER QUALITY PARAM.		5 4	C 1-	1L Poly K	COLLECTED
/ 103	160.1	s н	2S04 pH<2 1-	1L Poly L	COLLECTED COLLECTED
TPHC V	418.1	Э н	2\$04 pH<2 1- 1	IL Poly M	N

SAMPLING EQUIPMENT	PURGING				NUMBER OF IN-LINE FILTERS USED:
WATER LEVEL EQUIPMENT USED:	M	DEDIC	ATED SUBMIRSABLE F	PUMP (WHALE)	1
▼ ELECTRIC CONDUCTIVITY PROF	1 1	DEDICA	ATED TEFLON BAILER	₹	
FLOAT ACTIVATED	अग्मवह)	IN-LII	NE FILTER (INORGAN	(ICS)	
OTHER		OTHER			
Notes: * PAL inorganics: ICP me	tals (SS10), AS (SD2	21), SE (SD21), TL	(SD09), SB (SD28)), PB (SD20), HG (S	SB01).
Water Quality Parameter - Purge H), CL/SO4 (TT10),	TSS (160.2), ALK	(301.0), HARDNESS.
	Ond Uhr	rung 9			
o with the	leo headspo y not wort	H'KJ (1 W	· (D. P. Tu
	<i>"</i>	SAMPLERS SIGNA	ATURE VICE	may E.	corral U

ABB ENVIRONMENTAL SERVICES, INC. FILE TYPE CGW SITE TYPE WELL JOB 9144-02								
FILE TYPE CGW SITE TYPE WELL JOB . 9144-02 NUMBER								
PROJECT USAEC-FT. DEVENS	WEATHER	ir, windy, 1	<u>రి క</u>	LOCATION START	1600	END 1715		
SITE 10 57M 95 (SAMPLE SAMPLE NUMBER	M X 57 0 5	X2 DAY	MP 2 13 2 2 3 17	STUDY AI	SA 57		
WATER LEVEL / WELL DATA M	EASURED FROM	PID HEADSPAC	READINGS	WELL INTEGRI	TY	YES NO		
WELL DEPTH 22.33 FT V	TOP OF WELL	BREATHING	ka ppm	PROTECTIVE C	ASING SECU	RE 🗸 🗌		
WATER DEPTH 1495 FT	TOP OF CASING	ZONE L	ka ppm	WELL LOCKED				
	WELL DIAMETER = 4"	HEAD	_	PVC WELL CAP	CTIVE			
X 1.68 gal/ft (4" well) = x gal/ft (well)	12.3 GAL/VO		UP 2.5±	FT CASI	NGE/WELL ERENCE	-0,43 FT		
PURGE DATA VOLUME #	- 1	2 3	4	5		SAMPLE OBSERVATION		
GALLONS	0 12	24 36	48	60		CLEAR		
TEMPERATURE, deg. C	8,3 10.1	10.1 9.7	10-2 i	0.3		TURBID		
pH units	5.6	5,5 5.4	5.3	S.5		COLORED		
SPECIFIC CONDUCTIVITY, umho/cm	88 82	76 75	77	75		ODOR		
TURBIDITY' ntu	7 0	0 0	0	0		OTHER (SEE NOTES)		
REDOX (AT COMPLETION OF PURGING			2	40mV		(0.0.0.)		
D.O. (my/L)	10.3 9.0	9.4 9.5	10.1	9.4				
SAMPLE PARAMETERS COLLECTER	D METHOD # FRA	CTION CODE PR	ESERATIVE	VOLUME	SAMPLE BOT	TLE NUMBER		
svocs	UM18	MS	4C	2- 1L AG	A E	control # 176		
PEST./PCBS	UW19	EC	4C	2- 1L AG	C C			
voc	UM20	VP	HCL,4C	4- 40 ml AG	E f	: G H		
INORGANICS-UNFILTERED	*	N	HNO3 pH<2	1- 1L Poly	I			
INORGANICS-FILTERED	*	NF	HNO3 pH<2	1- 1L Poly	J	IF MS/MSD COLLECTED		
WATER QUALITY PARAM. / TDS	* 160.1	С	4C	1- 1L Poly	К	IF DUPLICATE		
/ 103	100.1	S	H2SO4 pH<2	1- 1L Poly	L	COLLECTED		
трнс <u></u>	418.1	С	H2SO4 pH<2	1- 1L Poly	M N			
SAMPLING EQUIPMENT	PURGI	NG SAMPLING			NU	IMBER OF IN-LINE		
WATER LEVEL EQUIPMENT USED:	V	′ 🖂	ICATED SUBMIR	SABLE PUMP (WHAL	FI	LTERS USED:		
ELECTRIC CONDUCTIVITY PROBE	(taken	-	ICATED TEFLON					
FLOAT ACTIVATED	211146)	H	LINE FILTER (
OTHER	H	H	•					
Notes: * PAL inorganics: ICP met Water Quality Parameters								
Purae Hea	headspace	= bka		, ,		•		
J. J.	1	J						
		CAMDI EDE ET	CNATURE ! /	Mangu E	Robe	SM		

ABB ENVIRONMENTAL SERVICES, INC							
FIELD DATA RECORD - GROUND	WATER	FILE TYPE CGW SITE TY	PE WELL JOB 9144-02 NUMBER				
PROJECT USAEC-FT. DEVENS	WEATHER PARTY ELE	DO 7 385 LOCATION ACTIVITY	START 103 END 1130				
ITE ID 57M-95-0	SAMPLE MX	1706X2 DATE 15 TETS	study area SA 57				
WATER LEVEL / WELL DATA M	HEASURED FROM PID	HEADSPACE READINGS WELL IN	TEGRITY YES NO				
WELL DEPTH 24.3± FT	l .	10101	IVE CASING SECURE				
WATER DEPTH 12.79 FT	TOP OF CASING	WELL LO	CKED ,				
ا معمد ما	WELL HEADIAMETER = 4"	DK() Print	L CAP PRESENT				
x 1.68 gal/ft (4" well) =	PRO	TECTIVE ING STICK-UP 2.0± FT	POTECTIVE CASINGE/WELL -O IG ET				
Dx gal/ft (well)	FRO	M GROUND	CASINGE/WELL -0.19 FT				
PURGE DATA VOLUME #	- i 2	3 4 5	SAMPLE OBSERVATION				
GALLONS	0 19 33	57 76 8895	CLEAR				
TEMPERATURE, deg. C	10.0 9.6 9.3	9.30 910 9.20	TURBID				
pH units	4.49 4.4	4 4,44 4.47 4.51	COLORED				
SPECIFIC CONDUCTIVITY, umho/cm	.044 .044 .043	.043 .043 .044	ODOR				
TURBIDITY' ntu	0 0 0	0 0 0	OTHER (SEE NOTES)				
REDOX (AT COMPLETION OF PURGING	200		(SEE NOTES)				
	32						
SAMPLE PARAMETERS COLLECTE	D METHOD # FRACTION C	DDE PRESERATIVE VOLUME	SAMPLE BOTTLE NUMBER				
svocs	UM18 MS	4C 2- 1L AG	A B CONTROL # 178				
PEST./PCBS	UW19 EC	4C 2- 1L AG	C D				
voc	UM20 VP	HCL,4C 4- 40 ml	AG E F G H				
INORGANICS-UNFILTERED	* N	HNO3 pH<2 1- 1L Po	ly [
INORGANICS-FILTERED	* NF	HN03 pH<2 1- 1L Po					
WATER QUALITY PARAM.	* C	4C 1- 1L Po					
/ TDS	160.1 S	H2SO4 pH<2 1- 1L Po	ly L IF DUPLICATE COLLECTED				
ТРНС	418.1 C	H2S04 pH<2 1- 1L Po	ly M N				
SAMPLING EQUIPMENT	PURGING SAM	APLING	NUMBER OF IN-LINE FILTERS USED:				
WATER LEVEL EQUIPMENT USED:	\checkmark	DEDICATED SUBMIRSABLE PUMP					
ELECTRIC CONDUCTIVITY PROB	E (taken	DEDICATED TEFLON BAILER	<u>+</u>				
FLOAT ACTIVATED	2112(96)	IN-LINE FILTER (INORGANICS)					
OTHER		OTHER					
Notes: * PAL inorganics: ICP metals (SS10), AS (SD21), SE (SD21), TL (SD09), SB (SD28), PB (SD20), HG (SB01).							
Water Quality Parameter	s: PO4 (TF27), TKN (TF26)), NIT (TF22), CL/S04 (TT10), TSS					
Iwge	420 headspace	- U Prim					
	SA	MPLERS SIGNATURE	101/				

ABB ENVIRONMENTAL SERVICES, IN	c.					
FIELD DATA RECORD - GROUN	DWATER		FILE TYPE C	GIV SITE TYPE	WELL	JOB 9144-02 NUMBER
PROJECT USAEC-FT. DEVENS	WEATHER	^ه 5, 5πα	oùU	LOCATION STAR	1545	END 17:00
SITE ID 57M-95-	07X SAMPLE NUMBER	M X 5 7	107×20	ATE 2/14/96	STUDY AF	REA SA 57
WATER LEVEL / WELL DATA	MEASURED FROM	PID HE	ADSPACE READINGS	WELL INTEGR	ITY	YES NO
WELL DEPTH 14.4± FT WATER DEPTH 3.02 FT HEIGHT OF WATER COLUMN 11.38 FT Ex 1.68 gal/ft (4" well) =	TOP OF WELL TOP OF CASING WELL DIAMETER = "" GAL/VO	BREATH ZONE WELL HEAD	pkg ppm	PROTECTIVE WELL LOCKED PVC WELL CA	P PRESENT .	
Dx gal/ft (well)	[7], GAZ/VO	FROM GF		FT CAS	INGE/WELL FERENCE	-0.34 FT
PURGE DATA VOLUME #	- i	2	3 4	5	<u>s</u>	SAMPLE OBSERVATION
GALLONS	0 19	33	57 76	95		CLEAR
TEMPERATURE, deg. C See Siells	6.2 7.9	8.1	7.1 8.1	8.1		TURBID
pH units (calibration if ? herrby be sault	4.90 4.824	4.33	4.78 4.72	4.754		COLORED
SPECIFIC CONDUCTIVITY, umho/cm	50 60	વુસુ	69 66	66		ODOR
TURBIDITY' ntu	0.52 0.21	0.15	0.15 0.18	0.13		OTHER (SEE NOTES)
REDOX (AT COMPLETION OF PURGING				274 NV		(SEE NOTES)
P.0	6.56 5.96	6:49	6.64 6.04	6.13		
SAMPLE PARAMETERS COLLECTE		CTION CODE	PRESERATIVE	VOLUME	SAMPLE BOT	TLE NUMBER
svocs V	UM18	MS	4C	2- 1L AG	A 8	CONTROL #
PEST./PCBS	UW 19	EC	4C	2- 1L AG	C D	
voc	UM20	VP	HCL,4C	4- 40 ml AG	E F	G H
INORGANICS-UNFILTERED	*	N	HN03 pH<2	1- 1L Poly	1	_
INORGANICS-FILTERED	*	NF	ниоз рн<2	1- 1L Poly	J	IF MS/MSD COLLECTED
WATER QUALITY PARAM. / TDS	* 160.1	С	4C	1- 1L Poly	К	H
/ 103	100.1	s	H2SO4 pH<2	1- 1L Poly	L	COLLECTED COLLECTED
трнс 🧹	418.1	С	H2SO4 pH<2	1- 1L Poly	M N	
SAMPLING EQUIPMENT	PURGI	NG SAMPLI	NG		NUI	MBER OF IN-LINE
WATER LEVEL EQUIPMENT USED: ELECTRIC CONDUCTIVITY PROB FLOAT ACTIVATED OTHER	. 🖸		,	(INORGANICS)	FIL	TERS USED:
Notes: * PAL inorganics: ICP me Water Quality Parameter	tals (SS10), AS (SE s: PO4 (TF27), TK	021), SE (SE N (TF26), N)21), TL (SD09), S	SB (SD28), PB (SD2 (TT10), TSS (160), HG (SB01 2), ALK (301	I). I.O), HARDNESS.
	His head			.,		
		SAMPLE	ERS SIGNATURE	Wancy	E. Ro	la/ij
(i)	6.46 by	Ocion	5N 210			/

¥6.36

VIRONMENTAL SERVICES, INC.	
FIELD DATA RECORD - GROUNDWATER	FILE TYPE CGW SITE TYPE WELL JOB 9144-02
ROJECT USAEC-FT. DEVENS WEATHER CAN	LOCATION START 0905END 1300
ITE ID 57M 95 08A SAMPLE NUMBER	
WATER LEVEL / WELL DATA MEASURED FROM	PID HEADSPACE READINGS WELL INTEGRITY YES NO
WELL DEPTH (4.3± FT V TOP OF WELL	BREATHING bkc ppm PROTECTIVE CASING SECURE
WATER DEPTH 2.63 FT TOP OF CASING HEIGHT OF WATER COLUMN 11.67 FT DIAMETER = 4"	WELL LOCKED WELL LOCKED PVC WELL CAP PRESENT
WATER COLUMN 11,67 FT DIAMETER = $\frac{1}{2}$ GAL/V	PROTECTIVE POTECTIVE CASING STICK-UP 1.1± FT CASINGE/WELL -0.23 FT
x gal/ft (well)	FROM GROUND DIFFERENCE
PURGE DATA VOLUME #	2 3 4 5 SAMPLE OBSERVATION
GALLONS 0 20	40 60 80 100 X CLEAR by 5 Volume
TEMPERATURE, deg. C	7.1 7.8 7.7 TURBID
pH units 5,482 5,62	
SPECIFIC CONDUCTIVITY, umho/cm 82 72	72 74 72 69 ODOR
TURBIDITY' ntu 190 107	(SEE NOTES)
REDOX (AT COMPLETION OF PURGING)	165mV
D.O. (M/L) @ 7.3.2 4.2	6-17 6.74 6.17 5.83
SAMPLE PARAMETERS COLLECTED METHOD # FR	ACTION CODE PRESERATIVE VOLUME SAMPLE BOTTLE NUMBER
svocs um18	MS 4C 2- 1L AG A B CONTROL # 187
PEST./PCBS WW19	EC 4C 2- 1L AG C D
VOC MAZO	VP HCL,4C 4- 40 ml AG E F G H
INORGANICS-UNFILTERED 🗶 *	N HNO3 pH<2 1- 1L Poly I
INORGANICS-FILTERED X *	NF HNO3 pH<2 1- 1L Poly J IF MS/MSD COLLECTED
WATER QUALITY PARAM. * 160.1	C 4C 1- 1L Poly K
, 100.1	S H2SO4 pH<2 1- 1L Poly L COLLECTED
TPHC 418.1	C H2SO4 pH<2 1- 1L Poly M N
SAMPLING EQUIPMENT PURG WATER LEVEL EQUIPMENT USED: ELECTRIC CONDUCTIVITY PROBE (†ake)	DEDICATED SUBMIRSABLE PUMP (WHALE) DEDICATED TEFLON BAILER
-	IN-LINE FILTER (INORGANICS)
OTHER	OTHER
Water Quality Parameters: PO4 (TF27), T	SD21), SE (SD21), TL (SD09), SB (SD28), PB (SD20), HG (SB01). KN (TF26), NIT (TF22), CL/SO4 (TT10), TSS (160.2), ALK (301.0), HARDNESS. SPACE = (1) 771
	SAMPLERS SIGNATURE DOSAN

ABB ENVIRONMENTAL SERVICES, INC. FILE TYPE CGW SITE TYPE WELL JO	DB 9144-02
	JMBER 7144-02
PROJECT USAEC-FT. DEVENS WEATHER CONDY, 305 LOCATION START 8:50	END 11:55
SITE ID 57M-95-08B SAMPLE MX5708BZ DATE 2/1596 STUDY AREA (AOC)	SA 57
WATER LEVEL / WELL DATA MEASURED FROM PID HEADSPACE READINGS WELL INTEGRITY	YES NO
WELL DEPTH 30,21 FT V TOP OF WELL BREATHING BICO PPM PROTECTIVE CASING SECURE	$M \sqcup 1$
WATER DEPTH 3.36 FT TOP OF CASING WELL DIKE PPM WELL LOCKED	$M \sqcup 1$
HEIGHT OF WELL HEAD PVC WELL CAP PRESENT WATER COLUMN 26.84 FT DIAMETER = 4" HEAD PVC WELL CAP PRESENT	$\mathbf{M} \cup \mathbf{M}$
Tx 1.68 gal/ft (4" well) = U5.1 GAL/VOL CASING STICK-UP 2.5 FT CASINGE/WELL DIFFERENCE	-0.50 FT
PURGE DATA VOLUME # _ 1 2 3 4 5	PLE OBSERVATION
GALLONS 0 45 90 135 180 225	CLEAR
TEMPERATURE, deg. C 75 9,3 9.7 9.9 9.7 9.9	TURBID
pH units 5.7 5.64 5.62 5.64 5.62	COLORED
SPECIFIC CONDUCTIVITY, ummore 5,9 241 235 236 234 233	ODOR
TURBIDITY! ntu [1.23 0.1] 0.13 0.15 0.18 0.20	OTHER (SEE NOTES)
REDOX (AT COMPLETION OF PURGING) 204	(SEE NOTES)
D.C. (14/2) 7.7 6.4 6.90 6.32 6.83	
SAMPLE PARAMETERS COLLECTED METHOD # FRACTION CODE PRESERATIVE VOLUME SAMPLE BOTTL	E NUMBER
SVOCS UM18 MS 4C 2- 1L AG A B	CONTROL #
PEST./PCBS UW19 EC 4C 2- 1L AG C D	
VOC 1 UM20 VP HCL,4C 4-40 ml AG E F	G H
INORGANICS-UNFILTERED * N HNO3 pH<2 1- 1L Poly I	
INORGANICS-FILTERED * NF HNG3 pH<2 1-1L Poly J	IF MS/MSD COLLECTED
WATER QUALITY PARAM. * C 4C 1- 1L Poly K 160.1	IF DUPLICATE
s H2SO4 pH<2 1- 1L Poly L	COLLECTED
TPHC 418.1 C H2S04 pH<2 1- 1L Bold M N	
FILT FILT	ER OF IN-LINE ERS USED:
WATER LEVEL EQUIPMENT USED: M DEDICATED SUBMIRSABLE PUMP (WHALE)	/
V ELECTRIC CONDUCTIVITY PROBE (TAKEN) 2/12/46) DEDICATED TEFLON BAILER WHITE STATES (INDECANTES)	
FLOAT ACTIVATED IN-EIRC FIETER (INORGANICS)	
OTHEROTHER	
Notes: * PAL inorganics: ICP metals (SS10), AS (SD21), SE (SD21), TL (SD09), SB (SD28), PB (SD20), HG (SB01)	
Water Quality Parameters: PO4 (TF27), TKN (TF26), NIT (TF22), CL/SO4 (TT10), TSS (160.2), ALK (301.	U), HAKUNESS.
Purge HzO head space = U.L. J.M	
SAMPLERS SIGNATURE AND MANAGE	goney
1. 19	1 7
	<u>-</u> .

			GROUNDW	ATER FIELD S	AMPLE DAT	TA RECORD		
	oject: USATH				Study Area:	SA 57		
	oject Number:		9144.02		Date:	2/13/96		
Sar	mple Location ne: Start:(10:63M 0815 6	## End: _	1045	Signature o	f Sampler:	MR/SM	
	Well Depth 4	3.5 FL	Measured Historical	Top of Weil Top of Protect Casing	Well Riser Stive (from ground	ick-up <u>i.88</u> FL	Protective 0.22FL Casing/Well Difference Protective 2.1±FL	
	Depth to Water	26,34 _{FL}	Well Material: PVC SS	Well Lacked?:YesNo		2 inch 4 inch 6 inch	Casing Water Level Equip. Use V Elect. Cond. Probe Float Activated Press. Transducer	
	Heignt of Water	Column X 16 Ft		145 -	and Califfrage (Weil Integrity: Prot. Casing Secure Concrete Collar Inta Other		
		Purging/Sai	mpling Equipment L	lsed:		Decontan	ination Fluids Used:	
	(V If Use Purging	Sampling	Pensaltic Pump Submersible Pump Bailer PVC'Silicon Tubing TeflorySilicon Tubing Airlitt Hand Pump In-line Filter Press/vac Filter Whale pump	Equipment ID		25% M Deloniz Liquino Hexane	or (103%) ethanol/75% ASTM Type il ted Water xx Solution e D.I. Water Solution	water
		oc bkg	_ppm Well Mouth	<i></i>			Cobservations: roid Clear Cio lored Odor Gal. @ 116 Gal	7
,		-		12.3 5.6 370	12.0 5.3 362	11.8 17.7 264	12.2	12.5
	Dissolved C	xygen, ppm		<u> </u>	35	3.5	<u> </u>	315
Anı	alytical Paramete	r / If Field Filtered	i Preservat Method		✓ if Sample Collected	Sample	Borde IDs (166)	
Ina	VOA SVOA Pest/PC3 Irganics Explosives TPH TOC rate Notes:	7	HCL 40C 40C HN0, 4°C H,S0, H,S0,	4040 ml 2- liter AG 1-1 liter AG 3-1 liter P 2-1 liter AG 2-1 liter AG 1-2 liter P 1-2 liter P		D quel K		<u>H</u>

9202159D (j)

ABB Environmental Services, Inc.

PROJECT USAEC - FT. DEVENS			FIELD SA	MPLE NUM	BER M	X 57	097	K / ST	UDY ARE	EA/AOC	-Aoc	57
SITE 10 57M-96-	098			SITE T	IPE W	ELL		s	AMPLING	DATE	1/3	12/2
CATION			~-{ } '	JOB NUM	BER	7144-0	78.	12. 3	FILE	TYPE	CGN	
	foil					,	•		u	EATHER	Surr	How Ws
WATER LEVEL / WELL DATA		TOP (PROTEI G CASIN		up		4	PROTECT CASING	METT D	IFF.	FT
WELL DEPTH 25, 75 FT	EASURED ISTORICAL	0	OVC	(FRO	OH GROUN	ــا (ه				• 1		
WATER DEPTH 17.82 FT	14)	GAL/VOL	٦ ٔ		LL INTEG OT. CASI	RITY: NG SECURI	E YES		D1	WELL IAMETER	4 IN	
HEIGHT OF HATER COLUMN 7,93 FT	15	TOTAL G	AL PURGE	D WE	ICRETE CI LL LOCKEI C WELL C		TACT	H F			L <u>J</u> IN	CH
1.68 gal/ft (4")	cc. [4	MOTENT A	10 0	PPH	WELL HO		PPN	stan	ted	pure	ا چىم	5 :05
gal/ft PID REA /2 well beyon	DINGS: A	^	IR O	PPR	SELL HO	JIH 0		Stuil	red	٥٠٠٠	dun	15:52
PURGE DATA VOLUME	15:12	19:15	15:25	15:30	15:34	15:40	15:43	B:50	ha	al wat	in level	17.8L
GALLONS م	1	4	3	6	b.5	9	13	15]	SAMPLI	COSERV.	ATIONS 16:3
PUMPING RATE (GPH)	500	500	500	500	500	500	500	500]		EAR OLIDY	
TEMP, DEG C	13.6	13.2	13.2	13 j	13-1	13.2	13.0	12.9	/ ,		LORED	
PH, UNITS OPH PAPER	5.61	5.59	5.56	5.82	5.80	5.65	5.55	5.51	V	000	OR HER (SEE	MOTES)
SPECIFIC CONDUCTIVITY, umhos/cm		0,058	0,059	0.059	0.058	0.059	•	0-058	1			
TURBIDITY, ntu	19	2	0	0	0	0	778	312		•		
REDOX (2 COMPLETION OF PURGING)	· 312	_348	v 348	349	358	376	378	312	V			_
		42 0 V	7.61	276	4.00	5 CO	230	0.08	1/			
JIPMENT DOCUMENTATION	9.06		7.81	7.76	_	7.59	7.78		V.	SED.		
RGING SAMPLING	EQU NP ISC	IPMENT II	•	POTABLE	JIDS USEI LE WATER	, י ס	HATER ELE	LEVEL EQ	UIP. US	SE		
PEGING SAMPLING PERISTALTIC PU DEDICATED SUBM BAILER	EQU NP 150 ERS1BLE PI 2	IPMENT II	-	POTABLE LIQUII	JIDS USEI LE WATER	י י ס` י	HATER ELE	LEVEL EQ	UIP. US	SE		
PEGING SAMPLING PERISTALTIC PU DEDICATED SUBM BAILER PVC/SILICON TU IN-LINE/DISPOS	EQU HP ISC ERSIBLE PI 2'	IPMENT II	- B	POTABI LIQUII STEAM	JIDS USEI LE WATER NOX CLEANING	G -	HATER ELE	LEVEL EQ	UIP. US	SE		
PEGING SAMPLING PERISTALTIC PU DEDICATED SUBM BAILER PUC/SILICON TU	EQUIND ISCO	IPMENT III O # LMP H	S MM	DECON FLE POTABLE LIQUII STEAM NUMBER OF	JIDS USEL LE MATER HOX CLEANING F FILTER:	G - S USED SAM	PLE	LEVEL EQ CTRIC CO SSURE TR	MD. PRO	OBE ER	BERS PLE MO	BOTTLE
PEGING SAMPLING PERISTALTIC PU DEDICATED SUBM BAILER PVC/SILICON TU IN-LINE/DISPOS OTHER AMALYTICAL PARAMETERS	EQUIND ISCO ERSIBLE PI 22 BING ABLE FILTI METHOD MUMBER	IPMENT II O # UMP H 4 # ER 0.45	S MM ON PRES	DECOM FLE POTABLE LIQUIT STEAM NUMBER OF	JIDS USEL LE WATER HOX CLEANING F FILTER: VOLUME REQUIRE	G S USED SAMI	PLE LECTED	LEVEL EQ CTRIC CO SSURE TR	BOTTLE	OBE ER	MBERS PLE MC	
PEGING SAMPLING PERISTALTIC PU DEDICATED SUBM BAILER PVC/SILICON TU IN-LINE/DISPOS OTHER AMALYTICAL PARAMETERS VOC SVOC	EQUIND ISCO	IPMENT III O # LMP H	S MM ON PRES	DECON FLU POTABLE LIQUII STEAM NUMBER OF ERVATION THOD 4 DEG C G C	JIDS USEL LE WATER HOX CLEANING F FILTER: VOLUME REQUIRE	G S USED SAMI	PLE	LEVEL EQ CTRIC CO SSURE TR	BOTTLE	OBE ER	BERS FOR MC	
PERISTALTIC PU DEDICATED SUBM BAILER PVC/SILICON TU IN-LINE/DISPOS OTHER ANALYTICAL PARAMETERS VOC SVOC PEST/PCBs	EQUIND ISCI	FRACTIC CODE VP	ON PRESE ME HCL, 4 DE	DECON FLU POTABLE LIQUII STEAM NUMBER OF ERVATION THOD 4 DEG C G C	JIDS USEI LE WATER HOX CLEANING F FILTER: VOLUME REGUIRI (4) 60 (2) 1 1 (3) 1	G SUSED SANIED COLL ML AG L AG	PLE	LEVEL EQ CTRIC CO SSURE TR	BOTTLE	OBE ER	BERS PLE MC.	
PEGING SAMPLING PERISTALTIC PU DEDICATED SUBM BAILER PVC/SILICON TU IN-LINE/DISPOS OTHER AMALYTICAL PARAMETERS VOC SVOC	EQUIND ISCIERSIBLE PI 2'S BING ABLE FILTI METHOD MUMBER UN20 UN18 UH02	FRACTIC CODE VP HS EC	ON PRESE ME HCL, 4 DE HMO3	PECON FLU POTABLE LIQUII STEAM MUMBER OF ERVATION THOD 4 DEG C G C G C TO pH<2 TO pH<2	JIDS USEI LE WATER HOX CLEANING F FILTER: VOLUME REGUIRI (4) 60 (2) 1 1 (3) 1	G SUSED SANIED COLL ML AG L AG	PLE LECTED	LEVEL EQ CTRIC CO SSURE TR	BOTTLE	OBE ER	#BERS P.S. MC. 	
PERISTALTIC PU DEDICATED SUBM BAILER PVC/SILICON TU IN-LINE/DISPOS OTHER VOC SVOC PEST/PCBs PAL INORGANICS (see notes) LEAD ONLY EXPLOSIVES TPHC	EQUIND ISCO ERSIBLE PI 2' BING ABLE FILTI METHOD MUMBER UM20 UM18 UH02 UH13 SD20	FRACTIC CODE VP HS EC	ON PRESS HCL, 4 DE HMO3 HMO3 4 DE	PECON FLU POTABLE LIQUII STEAM NUMBER OF ERVATION THOD 4 DEG C G C TO pH<2 TO pH<2 G C TO pH<2	F FILTER: VOLUME REQUIR: (4) 60 (2) 1: (3) 1: 1 L P-((3) 1: 2 1 L AG	S USED SAMED COLL ML L AG L AG CUBE	PLE LECTED	LEVEL EQ CTRIC CO SSURE TR	BOTTLE	OBE ER	#BERS	
PEGING SAMPLING PERISTALTIC PU DEDICATED SUBM BAILER PVC/SILICON TU IN-LINE/DISPOS OTHER AMALYTICAL PARAMETERS VOC SVOC PEST/PCBs PAL INORGANICS (see notes) LEAD ONLY EXPLOSIVES	BING ABLE FILTI METHOD MUMBER UN20 UN18 UH02 UH13 SD20 UN19 UN32 418.1 415.1 TF22	FRACTIC CODE VP NS EC O S	ON PRESS HCL, 4 DE 4 DE HN03 4 DE H2SO H2SO H2SO	PECON FLU POTABLE LIQUII STEAM NUMBER OF ERVATION THOD 4 DEG C G C TO pH<2 TO pH<2 G C 4 TO pH<2 4 TO pH<4	F FILTER: VOLUME REQUIR: (4) 60 (2) 1 1 (3) 1 1 1 L P-(2 1 L AG 2 1 L AG 2 1 L P-(G S USED SAMED COLL AG CUBE	PLE LECTED	LEVEL EQ CTRIC CO SSURE TR	BOTTLE	OBE ER	MBERS PLE MC. J. J. J. J. J. J. J. J. J.	
PEGING SAMPLING PERISTALTIC PU DEDICATED SUBM BAILER PVC/SILICON TU IN-LINE/DISPOS OTHER AMALYTICAL PARAMETERS VOC SVOC PEST/PCBs PAL INORGANICS (see notes) LEAD ONLY EXPLOSIVES TPHC TOC AMIONS	BING ABLE FILTI METHOD MUMBER UN20 UN18 UH02 UH13 S020 UN19 UN49 UN452 418.1 415.1 TF22 TT10 310.1	FRACTIC CODE VP NS EC O O C O O O O O O O O O O	ON PRESIDENT ME HCL, 4 DE HMO3 HMO3 4 DE H2SO H2SO H2SO H2SO H2SO H1003	PECON FLU POTABLE LIQUII STEAM NUMBER OF ERVATION THOD 4 DEG C G C TO pH<2 G C 4 TO pH<2 G C 4 TO pH<5 G C TO pH<6	JIDS USEI LE WATER HOX CLEANING F FILTER: VOLUME REQUIR (4) 60 (2) 1 1 (3) 1 1 1 L P-(3) 1 1 2 1 L AG 2 1 L AG 2 1 L P-(1 L P-(1 L P-(1 L P-(G S USED SAMEED COLLE	PLE LECTED	LEVEL EQ CTRIC CO SSURE TR	BOTTLE	OBE ER	MBERS PLE MC	
PERISTALTIC PU DEDICATED SUBM BAILER PVC/SILICON TU IN-LINE/DISPOS OTHER ANALYTICAL PARAMETERS VOC SVOC PEST/PCBs PAL INORGANICS (see notes) LEAD ONLY EXPLOSIVES TPHC TOC	BING ABLE FILTI METHOD MUMBER UM20 UM18 UH02 UH13 S020 UW19 UW32 448.1 415.1 TF22 TT10	FRACTIC CODE VP HS EC N LC O S C S	ON PRESS ME HCL, 4 DE 4 DE HMO3 4 DE H2SO H2SO H2SO 4 DE HMO3 4 DE	PECON FLU POTABLE POTABLE LIQUII STEAM NUMBER OF ERVATION THOD 4 DEG C G C TO pH<2 G C 4 TO pH<2 4 TO pH<2 G C TO pH<2 G C TO pH<2 G C TO pH<2 G C TO pH<2	JIDS USEI LE WATER HOX CLEANING F FILTER: VOLUME REGUIRI (4) 60 (2) 1 1 (3) 1 1 1 L P-1 2 1 L AG 2 1 L P-1 1 L P-1 1 L P-1 1 L P-1 2 1 L P-1	G S USED SAMI ED COLI ML AG L AG CUBE CUBE CUBE CUBE CUBE CUBE CUBE CUBE	PLE LECTED	LEVEL EQ CTRIC CO SSURE TR	BOTTLE	OBE ER	#BERS	
PERISTALTIC PU DEDICATED SUBM BAILER PVC/SILICON TU IN-LINE/DISPOS OTHER AMALYTICAL PARAMETERS VOC SVOC PEST/PCBs PAL INORGANICS (see notes) LEAD ONLY EXPLOSIVES TPHC TOC AMIONS TSS ONLY H20 GUALITY (see notes)	BING ABLE FILTI HETHOD MUMBER UH20 UH13 SD20 UH19 UM32 418.1 415.1 TF22 TT10 310.1 160.2	FRACTIC CODE VP MS EC N N CC CC N CC CC N CC CC	ON PRESS HCL, 4 DE HMO3 HMO3 4 DE H2SO H2SO H2SO 4 DE HMO3 4 DE HMO3 4 DE	PECON FLU POTABLE POTABLE LIQUII STEAM NUMBER OF ERVATION THOD 4 DEG C G C TO pH<2 TO pH<2 G C TO pH<2 G C TO pH<2 G C TO pH<2 G C TO pH<2 G C TO pH<2 G C TO pH<2 G C TO pH<2	JIDS USEI LE WATER HOX CLEANING F FILTER: VOLUME REQUIRI (4) 60 (2) 1 1 (3) 1 1 1 L P-1 1 L P-1	G S USED SAME ED COLI ML L AG L AG L AG CUBE CUBE CUBE CUBE CUBE CUBE CUBE CUBE	PLE LECTED	LEVEL EQ CTRIC CO SSURE TR	BOTTLE	OBE ER	#BERS	
PEGING SAMPLING PERISTALTIC PU DEDICATED SUBM BAILER PVC/SILICON TU IN-LINE/DISPOS OTHER AMALYTICAL PARAMETERS VOC SVOC PEST/PCBs PAL INORGANICS (see notes) LEAD ONLY EXPLOSIVES TPHC TOC AMIONS TSS ONLY	BING ABLE FILTI METHOD MUMBER UN20 UN18 UH02 UH13 S020 UN19 UN49 UN452 418.1 415.1 TF22 TT10 310.1	FRACTIC CODE VP MS EC N N CC CC N CC CC N CC CC	ON PRESS HCL, 4 DE HMO3 HMO3 4 DE H2SO H2SO H2SO H2SO 4 DE HMO3 4 DE H2SO 4 DE	PECON FLU POTABLE POTABLE LIQUII STEAM NUMBER OF ERVATION THOD 4 DEG C G C TO pH<2 TO pH<2 G C TO pH<2 G C TO pH<2 G C TO pH<2 G C TO pH<2 G C TO pH<2 G C TO pH<2 G C TO pH<2	JIDS USEI LE WATER HOX CLEANING F FILTER: VOLUME REQUIRI (4) 60 (2) 1 1 (3) 1 1 1 L P-(2 1 L AG 2 1 L AG 2 1 L P-(S USED SAME ED COLI HL L AG L AG CUBE CUBE CUBE CUBE CUBE CUBE CUBE CUBE	PLE LECTED	LEVEL EQ CTRIC CO SSURE TR	BOTTLE	OBE ER	#BERS	
PERISTALTIC PU DEDICATED SUBM BAILER PVC/SILICON TU IN-LINE/DISPOS OTHER ANALYTICAL PARAMETERS VOC SVOC PEST/PCBs PAL INORGANICS (see notes) LEAD ONLY EXPLOSIVES TPHC TOC ANIONS TSS ONLY H20 QUALITY (see notes) COLIFORM NOTES (1) PURGING COMPLETE WHE	BING ABLE FILTI METHOD MUMBER UH20 UH13 SD20 UH19 UM32 418.1 415.1 TF22 TT10 310.1 160.2	FRACTIC CODE VP HS EC N LC O S C N WOLUMES SS10): A	ON PRESS MCL, 4 DE HMO3 HMO3 4 DE HMO3 4 DE HMO3 4 DE HMO3 4 DE HMO3 4 DE HMO3 4 DE	POTABLE POTABL	JIDS USEI LE WATER HOX CLEAMING F FILTER: VOLUME REQUIRI (4) 60 (2) 1 1 (3) 1 1 1 L P-(1 L	S USED SAMI ED COLI ML L AG L AG L AG CUBE CUBE CUBE CUBE CUBE CUBE CUBE CUBE	PLE LECTED PARAMETERS (SD28	SAMPLE SAMPLE SYS GRS VARY S); PB (S	BOTTLE BY LESS D20);	SE ID NUI	PCE PMC.	
PERISTALTIC PU DEDICATED SUBM BAILER PVC/SILICON TU IN-LINE/DISPOS OTHER ANALYTICAL PARAMETERS VOC SYOC PEST/PCBs PAL INORGANICS (see notes) LEAD ONLY EXPLOSIVES TPHC TOC AMIONS TSS ONLY H2O QUALITY (see notes) COLIFORM NOTES (1) PURGING COMPLETE WHE (2) PAL INORGANICS: ICP H2O QUALITY: PO4 (T ALL PARAMETERS COLLE	BING ABLE FILTI METHOD MUMBER UH20 UH13 SD20 UH19 UM32 418.1 415.1 TF22 TT10 310.1 160.2 SD30, 909 M 5 MELL METALS (F27); TKM	FRACTIC CODE VP HS EC N LC O S C N VOLUMES SS10); A	ON PRESS MCL, 4 DE HMO3 HMO3 4 DE HAVE BEES S (SD22) MIT (TF	PECON FLU POTABLE POTA	JIDS USEI LE WATER HOX CLEAMING F FILTER: VOLUME REQUIRI (4) 60 (2) 1 1 (3) 1 1 1 L P-(1 L	S USED SAMI ED COLI ML L AG L AG L AG CUBE CUBE CUBE CUBE CUBE CUBE CUBE CUBE	PLE LECTED PARAMETERS (SD28	SAMPLE SAMPLE SYS GRS VARY S); PB (S	BOTTLE BY LESS D20);	SE ID NUI	PCE PMC.	
PERISTALTIC PU DEDICATED SUBM BAILER PVC/SILICON TU IN-LINE/DISPOS OTHER ANALYTICAL PARAMETERS VOC SVOC PEST/PCBs PAL INORGANICS (see notes) LEAD ONLY EXPLOSIVES TPHC TOC ANIONS TSS ONLY H20 QUALITY (see notes) COLIFORM NOTES (1) PURGING COMPLETE WHE (2) PAL INORGANICS: ICP H20 QUALITY: PO4 (T	EQUIND ISCO ERSIBLE PI BING ABLE FILTI METHOD MUMBER UN20 UN18 UN02 UN19 UN32 418.1 415.1 TF22 TT10 310.1 160.2 303, 909 N 5 WELL FEZT); TKM CTED AS TI	FRACTIC CODE VP HS EC N LC O S C N C S C N C S C N C C S C N C C S C N C C S C N C C S C N C C S C N C C S C N C C S C N C S C N C C S C N C C S C N C S C S	ON PRESIDENT NE HIGH A DE	PECON FLU POTABLE POTA	JIDS USEI LE WATER HOX CLEANING F FILTER: VOLUME REQUIRI (4) 60 (2) 1 1 (3) 1 1 1 L P-1 2 1 L AG 2 1 L AG 2 1 L P-1 1 L P-1 1 L P-1 1 L P-1 (1) 4 6 STER AMD WHEE 21); TL 1504 (TT10	S USED SAME ED COLI ML L AG L AG L AG CUBE CUBE CUBE CUBE CUBE CUBE CUBE CUBE	PLE LECTED PARAMETE SB (S02);	SAMPLE SERE TR SAMPLE SERE SYS RS VARY (3); PB (30)	BY LESS	SE ID NUI	PCE PMC.	

PROJECT USAEC - FT. DEVENS		F	IELD SAI	PLE NUM	1//	X 5 7		17	DY AREA	——	10/2/96
57M-95-	0 3 X			JOB MUN		Sunt				TYPE CG	30/96=
ACTIVITY START 11:16 END	13/3					>9144 -	.03]			ATHER	
WATER LEVEL / WELL DATA		TOP 0	F WELL	PROTEC	TIVE STICK-				ROTECT	IVE WELL DIFF.	FT
	ASURED (MC	(FRC	M GROUM			` لــــــــــــــــــــــــــــــــــــ	,, .		
WATER DEPTH 10.72 FT		GAL/VOL	7	PRO		RITY: NG SECURI OLLAR IN			DIA	WELL 2	
HEIGHT OF WATER COLUMN 8.83 FT	1	TOTAL GA	L PURGE!	WE	T FOCKE	0			, ,	_	•
1.68 gal/ft (4")	INGS: AM	DIENT AT	9- 0	PPM		UTH D.C			starte	ed purply	14:16
mil screen = 15.1 ft	IRGS: AFR	DIEM: VI	<u>`a3</u>		WELL AND	υ. υ. c	3 [[Sample	e hea	dopaso =	9.8 8pm
PURGE DATA WASHEST	14:20	14:35	4: 42 11-12	14:45	14:48	14:54)4:57 11.04	15:04	40	~	ley 15.53
GALLONS	0.1	0.3	1.0	1.2	1.4	1.6	1.8	2.2	lunc	SAMPLE OBSE	2 = 10 + 95 ERVATIONS
PUMPING RATE (GPM)	500	300	500	350	400	40D	400	400		CLEAR CLOUDY	
TEMP, DEG C	15.9	15.5	15.5	15.3	15.3	15.4	15.4	15.4	V	COLORED	
PH, UNITS OPH PAPER	5.07	5.04	5. 10	5.18	5.22	5.25	526	5.30	V	ODOR OTHER (S	SEE NOTES)
SPECIFIC CONDUCTIVITY, umhos/cm	0.061	0.060	0.062	0.069	140.0	1.070	0.671	0.072	~		
TURBIDITY, ntu	.9	4	2_	0	0	0	0	0	V	5 gal	· of
REDOX (a COMPLETION OF MUNCHING):		25/- W		251	251	25)	251	251	<i>y</i>	duch	1 6
JIPMENT DOCUMENTATION DO. [15*/.] JEGING SAMPLING PERISTALTIC PUM DEDICATED SUBME BAILER PVC/SILICON TUB IN-LINE/DISPOSAL OTHER	EQUII P ISCO RSIBLE PUI 2" ING	PMENT 1D	- -	LIQUII	E WATER	G -	WATER LE	LEVEL EQU CTRIC COI SSURE TR	JIP. USI ID. PROI	E dru	9
	METHOD NUMBER	FRACTIO CODE		ERVATION THOD	VOLUME REQUIR	SAM ED COL	PLE LECTED	SAMPLE	BOTTLE	ID NUMBERS	BOTTLE
	UN20	VP		4 DEG C	(4) 60					_/	<i>.</i>
1 7	UM18 UH02	MS EC	4 DE		(2) 1 (3) 1	L AG L AG					/
PAL INORGANICS (see notes)	UH13	N	ниоз	TO pH<2	1 L P-	CUBE				<u> </u>	<u></u>
1 =	SD20 UW19	LC N	HNO3 4 DE	TO pH<2 G C	(3) 1	L AG				<u> </u>	<i></i>
TPHC	UN32 418.1	0		6 TO PH<			A :			<u> </u>	/
ANIONS	415.1 TF22	0 \$	H2SO	4 TO pH<	2 1 L P-	CUBE	-			J	/
	TT10 310.1	C N		TO pH<2		CUBE	 			J <u></u>	/
TSS ONLY H20 QUALITY (see notes)	160.2	C S		4 TO pH<		CUBE	=			J,	/
COLIFORM	303, 909	C N	4 DE	TO pH<2	1 L P- 1 L P- (1) 4	CUBE	H -				
					STER	ILE	-			<u> </u>	/
NOTES (1) PURGING COMPLETE WHEN (2) PAL INORGANICS: ICP H20 QUALITY: PO4 (TF ALL PARAMETERS COLLECT SAMPLED BY:	METALS (S 27); TKN	\$10); AS (TF26);	(SD22) NIT (TF	; SE (SD) 22); CL/	21); TL 504 (TT1	(SD09);	SB (SD28	i); PB (S	D20); H	G (SB01).	CIMATELY 10%.

							
PROJECT USAEC - FT. DEVENS		FIELD	SÄIPLE NU	BER MX 5 7	7/01/	STUDY ARE	A/AOC AGC 57
SITE 10 5 4 M- 96-	10 X		SITE	TYPE WELL	16 16 17	SAMPLING	
10/2/96 9:17			JOS MUI	BER 0914	4-08	FILE	TYPE CON
ACTIVITY START END	1:17				ــــــــــــــــــــــــــــــــــــــ	UE	ATHER
		T 700 05 1511	20075	·		22275.07	
WATER LEVEL / WELL DATA	EASURED	TOP OF WELL	NG CASIN		FT	PROTECT CASING/	WELL DIFF. FT
10,5 T	ISTORICAL	<u> </u>		ION GROUND)	VEC NO	M / A	WELL ES INCH
WATER DEPTH 6.62 FT		GAL/VOL	PE	ELL INTEGRITY: NOT. CASING SECUT NOTETE COLLAR IN	EE H H	1 01/	AMETER 4 INCH
HEIGHT OF WATER COLUMN 8.92 FT	4.2	TOTAL GAL PURC		NICRETE COLLAR IN LL LOCKED C WELL CAP		Ħ	TT INCH
1.68 gal/ft (4") Uchlo gal/ft PID REA	DINCE: AM	BIENT AIR	PPN	WELL MOUTH	PPN	J	
Start Level 6,76		7.07 7.12		7.10 7.12	j	05 7.09	•
PURGE DATA TIME	925	930 935		945 9:50	9:55 18:		7
GALLONS	1 1 1	1.2 1.6	1.8	2.0 2.2	2.4 2.6		SAMPLE OBSERVATIONS
50 01/m PUMPING RATE (GPM)	50 M/M	750 my 250 1	7 250 My	750 ML 750 M	50 m/ 50 0	1/2 50 my	
TEMP, "EG C	13.3	13.3 13.3	13.3	13.3 13.3	134 13.	4 13.4	CLOUDY TURBID
PH, UNITS DPH PAPER	4,42	4.37 4.43		4.56 4.90	4.98 5.0	2 4.95	□ coor
SPECIFIC COMDUCTIVITY, umhos/cm	.024	0.24 0.24	10.24	0.24 0.24	0.24 0.2	4 0.24	OTHER (SEE NOTES)
TURBIDITY, ntu	0	0 0	0	0 0	0 0	io	Southern 10:06
REDOX (2-COMPLETION OF PURGING)	7	341 - 321	332	322 321	322 322	321	10.00
JIPMENT DOCUMENTATION DOCUMENT	EQUIF P ISCO RSIBLE PUR 2"		POTABLE LIQUID	O.26 (-0.15 UIDS USED LE WATER HOX CLEANING FILTERS USED	WATER LEVEL	2 (TO:22) EQUIP. USI COND. PROB TRANSDUCER	E
ANALYTICAL PARAMETERS	METHOD	FRACTION PRE	SERVATION	VOLUME SAM	PLE SAMP	LE BOTTLE	ID NUMBERS BOTTLE
П	NUMBER		ETHOD		LECTED		
VOC SVOC PEST/PCBs	UN20 UN18 UN02	MS 4 DI	, 4 DEG C EG C	(4) 60 ML (2) 1 L AG (3) 1 L AG		-/ ₋	<i></i>
PAL INORGANICS (see notes)	UH13					-/ ₋	<i></i>
LEAD ONLY	SD20 UU19		5 TO pH<2	(3) 1 L AG		-/	<i></i>
	UN32 478.1		 % T0 p#<2	_	_	<i>',</i>	<i>J</i>
Д тос	415.1	0 H2S0	¥ 10 pH<2	1 L AG		<i></i>	
	TF22			1 L P-CURE		<i></i>	
	TT10 310.1		GC TDbH<2	1 L P-CURE		J,	<i></i>
TSS ONLY	160.2	C 4 DE	G C	1 L P-CURE		<i></i>	
LI H2O QUALITY (see notes)		S H2SC	•	1 L P-CURE	-	J	J
_				1 L P-CUBE		<i>J</i>	<i></i>
☐ COLIFORM	303, 909	4 DE	•	(1) 4 OZ STERILE		<i>J</i>	
NOTES (1) PURGING COMPLETE WHEN (2) PAL INORGANICS: ICP H20 QUALITY: PO4 (TF ALL PARAMETERS COLLEC SAMPLED BY: RECEIVED BY:	METALS (SS 27); TKN (10); AS (SD22) TF26); NIT (TF	; SE (SD2 22); CL/S	1); TL (\$009); \$	8 (SD28); P8	(SD20); HG	(SB01).
SPLPIVED MYT							

PROJECT USAEC - FT. DEVENS	1.17]	FIELD SA		7	X 5 7	111	٠٠٠	UDY ARE	F	P 10/2	19
5 7 M - 96 -]		SITE I		ÆLL		5	ETTE		9/30/0	14
ACTIVITY START 11:18 END	11:20			JOS MUP	BER C	9144-0	28			TYPE ATHER	CGH	
WATER LEVEL / WELL DATA			OF WELL		CTIVE				PROTECT			
	EASURED HISTORICAL	`U	OF CASING ON C	G CASIA (FR	G STICK- ON GROUN	1		FT	CASING/	WELL DII نسر	F	
WATER DEPTH 3.41 FT 3.5	PS 102	GAL/VOL	7		LL INTEG		- YES		A	UE LL AMETER	E INCH	٥
HEIGHT OF HATER COLUMN 117 FT	1 -		AL PURGET	- α ^α	NCRETE C	OLLAR IN	ITACT	A E	1 "	ATE IER	INCH	
	4.5	IUIAL -	IL runu		C MELL C				Con	plokas	angling !	2:
gal/ft PID REA		MBIENT AI	R 000.3	PPN	WELL HO	UTH- 0.8	PPM	began began	- pury	luz.	10:35 11:45	
PURGE DATA VOLUME	10:45	10:53	10.58	11:02	11:12	11:16	11:22	11:25	11:38	11:4	1 <u> </u>	ţ
Stratus water level	-	0.3	<u>2ه.4</u> ط.0	0.7	0.8	0.9	1.2	1.5	4.00	4.00	4.00 OBSERVATIO	3. Nş
3.51 PUMPING RATE (GPM)		200	150	150	150	150	150	150	150	HELEA		4.
TEMP, DEG C		13 i	13.2	13.2	13.2	13.2	13.]	13.1	13.4	D cron		_
pH, UNITS OPH PAPER		1 1	6.29	610	6.09	 	6.10		6.10	TURS	ID .	
SPECIFIC COMBUCTIVITY, umhos/cm		0.149	0.148	0.147	0.147	0.146	0.146	0.147	0.145		R (SEE NOT	ES)
	3	2	0.148	0.147	0.14 F	0.146	0.14%	0.147	0.145	0.113	0.146	
interniti " Uffi	• • •					1	1	1				
	050	25! W	, 250	247	244	244	242	241	244	243	244	
TURBIDITY, ntu REDOX (**COMPLETION OF PURGING): JIPMENT DOCUMENTATION DO	050	1 . 1	0.27			<u> </u>		<u>. </u>	1 ,	•	244	
PEDOX (** COMPLETION OF PURGING): JIPMENT DOCUMENTATION DO JEGING SAMPLING	253 0.34 EQUI	0.34 IPMENT ID	0.27	247 0 · 2.6 DECON FLI	244 0.22 JIDS USEI	244	242 0.17 WATER	24 1 0.10 LEVEL EQ	2.44 0.09 JIP. USI	243 0.10		
JIPMENT DOCUMENTATION DO PERISTALTIC PUR DEDICATED SUBME	253 0.04 EQUI	0.34 IPMENT ID #	0.27	0 26 0 26 POTAB LIQUI	244 0.22 JIDS USEI LE WATER	0.18	242 0.17 VATER	241	2.44 0.09 JIP. USI	243 0, JO ED SE		
JIPHENT DOCUMENTATION DO DEDICATED SUBME BAILER PVC/SILICON TUE	253 0.04 Equipment is considered to the constant of the consta	0.34 IPMENT ID 0 #	0.27	0 · 26 PECON FLI POTAB LIQUII STEAM	244 0.22 JIDS USEI LE WATER	0.18	242 0.17 VATER	0.10 LEVEL EQUECTRIC COI	2.44 0.09 JIP. USI	243 0, JO ED SE		
JIPMENT DOCUMENTATION DO JIPMENT DOCUMENTATION DO JEGING SAMPLING PERISTALTIC PUR DEDICATED SUBME BAILER	253 0.04 Equipment is considered to the constant of the consta	0.34 IPMENT ID 0 #	0.27	0.26 0.26 DECON FLI POTAB LIQUII STEAM	244 0.22 JIDS USEI LE WATER	0.18	242 0.17 VATER	0.10 LEVEL EQUECTRIC COI	2.44 0.09 JIP. USI	243 0, JO ED SE		
JIPMENT DOCUMENTATION DO DEDICATED SUBME BAILER PVC/SILICON TUE	253 0.04 Equipment is considered to the constant of the consta	0.34 IPMENT ID 0 #	0.27	0.26 0.26 DECON FLI POTAB LIQUII STEAM	244 0.22 JIDS USET LE WATER NOX CLEANING	244 0.18 0 5 USED	24-2- 0.17- VATER ELE PRE	241 0.10 LEVEL EQU CTRIC COI SSURE TRU	244: 0.09 UIP. USI NO. PROI MISDUCEI	243 0, JO ED SE	0.10	.E
PEDOX (**COMPLETION OF PURGING) JIPHENT DOCUMENTATION DO JEGING SAMPLING PERISTALTIC PUB BAILER PVC/SILICON TUE IN-LINE/DISPOS/ OTHER VOC	253 0:04 EQUIT MP ISCO ERSIBLE PL 2* BING ABLE FILTE	0.34 IPMENT ID 0 # 4 # ER	0.27	0 - 26 DECON FLI POTAB LIQUII STEAM	244 0.22 JIDS USET LE WATER NOX CLEANING FILTERS VOLUME	244 0.18 0 USED SANGED COLI	24-2- 0-17- VATER ELE PRE:	241 0.10 LEVEL EQU CTRIC COI SSURE TRU	244: 0.09 UIP. USI NO. PROI MISDUCEI	243 0.10 ED BE	0.10	E
PEDOX (**COMPLETION OF PURGING): JIPHENT DOCUMENTATION DO JEGING SAMPLING PERISTALTIC PUB BAILER PVC/SILICON TUE IN-LINE/DISPOSA OTHER VOC SVOC	253 0-34 1 EQUI MP ISCC ERSIBLE PL 12* BING ABLE FILTE METHOD NUMBER	0.34 IPHENT ID 0.8 INE FRACTION CODE	0.27	0 · 26 DECON FLI POTAB LIQUII STEAN RUMBER OF RVATION HOD 4 DEG C	244 0.22 JIDS USEI LE MATER NOX CLEANING FILTERS VOLUME REQUIRE	244 0.18 0 USED SANGED COLI	24-2- 0-17- VATER ELE PRE:	241 0.10 LEVEL EQU CTRIC COI SSURE TRU	244: 0.09 UIP. USI NO. PROI MISDUCEI	243 0.10 ED BE	0.10	.E
JIPHENT DOCUMENTATION DO JEGING SAMPLING PERISTALTIC PUR DEDICATED SUBME BAILER PVC/SILICON TUE IN-LINE/DISPOSA OTHER VOC SVOC PEST/PCBs	253 0734 1 EQUITING ISCCERSIBLE PLUS BING ABLE FILTE METHOD HUMBER UN20 UM18	0.34 IPMENT ID 0.8 ILME FRACTION CODE VP MS	N PRESE HET HCL, 4 DEG 4 DEG	0 26 DECON FLI POTAB LIQUII STEAN UMBER OF RVATION HOD	244 0.22 JIDS USET LE MATER HOX CLEANING FILTERS VOLUME REGUIRE (4) 60 (2) 1 L	244 0.18 USED SANI ED COLI	24-2- 0-17- VATER ELE PRE-	241 0.10 LEVEL EQU CTRIC COI SSURE TRU	244: 0.09 UIP. USI NO. PROI MISDUCEI	243 0.10 ED BE	0.10	E
JIPMENT DOCUMENTATION DO JEGING SAMPLING PERISTALTIC PUB DEDICATED SUBME BAILER PVC/SILICON TUE IN-LINE/DISPOSA OTHER ANALYTICAL PARAMETERS VOC SVOC PEST/PCBs PAL INORGANICS (see notes)	253 0-34 1 EQUI NP ISCC ERSIBLE PL 2* BING ABLE FILTE METHOD NUMBER UN20 UN18 UH02 UH13 SD20	PRACTION CODE VP MS EC	N PRESE MET HCL, 4 DEG 4 DEG HN03 HN03	POTABLIQUII STEAM LIGUII STEAM RVATION HOD 4 DEG C C TO pH<2 TO pH<2	244 0.22 JIDS USET LE MATER ROX CLEANING FILTERS VOLUME REQUIRE (4) 60 (2) 1 L (3) 1 L	244 0.18 USED SANI ED COLI	24-2- 0-17- VATER ELE PRE-	241 0.10 LEVEL EQU CTRIC COI SSURE TRU	244: 0.09 UIP. USI NO. PROI MISDUCEI	243 0.10 ED BE	0.10	E
JIPMENT DOCUMENTATION DO JEGING SAMPLING PERISTALTIC PUBLICATED SUBHER BAILER PVC/SILICON TUE IN-LINE/DISPOSA OTHER ANALYTICAL PARAMETERS VOC SVOC PEST/PCBs PAL INORGANICS (see notes) LEAD ONLY EXPLOSIVES	253 0-84 1 EQUI MP ISCC ERSIBLE PL LI2* BING ABLE FILTE METHOD NUMBER UN20 UN18 UH02 UH13 SD20 UN19 UR32	PRACTION FRACTION FRACTION CODE VP MS EC H LC	N PRESE NET HCL, 4 DEG 4 DEG HN03 HN03 4 DEG	POTABLIQUII STEAM LIMBER OF RVATION HOD 4 DEG C C TO pH<2 TO pH<2	244 0.22 JIDS USET LE MATER HOX CLEANING FILTERS VOLUME REQUIRE (4) 60 (2) 1 L (3) 1 L 1 L P-0 (3) 1 L	244 0.18 USED ML AG AG AG	24-2. 0.17- VATER ELE PRE	241 0.10 LEVEL EQU CTRIC COI SSURE TRU	244: 0.09 UIP. USI NO. PROI MISDUCEI	243 0.10 ED BE	0.10	E
PEDOX (**COMPLETION OF PURGING): JIPMENT DOCUMENTATION DO JEGING SAMPLING PERISTALTIC PUB BAILER PVC/SILICON TUE IN-LINE/DISPOSE OTHER PAL INORGANICS (see notes) LEAD ONLY EXPLOSIVES TPHC TOC	253 O'34 NP ISCCERSIBLE PL ERSIBLE PL ERSIBLE FILTE METHOD MUMBER UM20 UM18 UH02 UM13 SD20 UM19 UM32 418.1 415.1	PRACTION CODE VP MS EC H LC O O	N PRESE MET HCL, 4 DEG 4 DEG HN03 HN03 4 DEG H2S04 H2S04	POTABLIQUII STEAM LIQUII STEAM RVATION HOD 4 DEG C C C TO pH<2 TO pH<2 TO pH<2	244 0.22 JIDS USET LE MATER HOX CLEANING CLEANING FILTERS VOLUME REGUIRE (4) 60 (2) 1 L (3) 1 L 1 L P-C (3) 1 L 1 L AG	244 0.18 USED ML AG AG AG	24-2. 0.17- VATER ELE PRE	241 0.10 LEVEL EQU CTRIC COI SSURE TRU	244: 0.09 UIP. USI NO. PROI MISDUCEI	243 0.10 ED BE	0.10	E
PEDOX (**COMPLETION OF PURGING): JIPMENT DOCUMENTATION DO JEGING SAMPLING PERISTALTIC PUR BAILER PVC/SILICON TUE IN-LINE/DISPOSE OTHER VOC SVOC PEST/PCBs PAL INORGANICS (see notes) LEAD ONLY EXPLOSIVES TPHC TOC ANIONS	253 0794 1 EQUITION ISCORDERS IBLE PLOTE BING ABLE FILTE METHOD MUMBER UN20 UN18 UH02 UN13 SD20 UN19 UN32 418.1 415.1 TF22 TT10	PRACTION FRACTION FRACTION CODE VP MS EC N LC	N PRESE MET HCL, 4 DEG 4 DEG HM03 HM03 4 DEG H2S04 H2S04 4 DEG	POTABLIQUII STEAN LIGUII STEA	244 0.22 JIDS USET LE MATER HOX CLEANING FILTERS VOLUME REGUIRE (4) 60 (2) 1 L (3) 1 L 1 L P-C (3) 1 L 2 1 L AG 1 L AG 1 L P-C 1 L P-C	244 0.18 USED ML AG AG AG	24-2. 0.17- VATER ELE PRE	241 0.10 LEVEL EQU CTRIC COI SSURE TRU	244: 0.09 UIP. USI NO. PROI MISDUCEI	243 0.10 ED BE	0.10	E
PEDOX (**COMPLETION OF PURGING): JIPHENT DOCUMENTATION DO JEGING SAMPLING PERISTALTIC PUR BAILER PVC/SILICON TUE IN-LINE/DISPOS/ OTHER ANALYTICAL PARAMETERS VOC SVOC PEST/PCBs PAL INORGANICS (see notes) LEAD ONLY EXPLOSIVES TPHC TOC ANIONS	253 O'34 NEGUTINE ISCC ERSIBLE PL LI2* BING ABLE FILTE METHOD MUMBER UN20 UN18 UH02 UN13 SD20 UN19 UN32 418.1 415.1 TF22	FRACTION FRACTI	N PRESE MET HCL, 4 DEG 4 DEG HN03 HN03 4 DEG H2S04 H2S04 H2S04 4 DEG HN03 4 DEG	POTABLIQUII STEAM LIQUII STEAM RVATION HOD 4 DEG C C TO pH<2 TO pH<2 TO pH<2 TO pH<2 TO pH<2 C TO pH<2 C TO pH<2 C	244 0.22 JIDS USET LE WATER HOX CLEANING FILTERS VOLUME REQUIRE (4) 60 (2) 1 L (3) 1 L 1 L P-C (3) 1 L 2 1 L AG 1 L P-C 1 L P-C 1 L P-C 1 L P-C 1 L P-C	244 0.18 USED ML AG AG AG	24-2. 0.17- VATER ELE PRE	241 0.10 LEVEL EQU CTRIC COI SSURE TRU	244: 0.09 UIP. USI NO. PROI MISDUCEI	243 0.10 ED BE	0.10	E
PEDOX (**COMPLETION OF PURGING): JIPMENT DOCUMENTATION DO JEGING SAMPLING PERISTALTIC PUR BAILER PVC/SILICON TUE IN-LINE/DISPOSE OTHER PAL INORGANICS (see notes) LEAD ONLY EXPLOSIVES TPHC TOC ANIONS	253 774 NEGUTIAN ISCUERSIBLE PLESTIBLE PLEST	FRACTION FRACTION FRACTION OB FRACTION CODE VP MS EC N LC O C N	N PRESE HET HCL, 4 DEG 4 DEG HN03 HN03 4 DEG H2S04 H2S04 4 DEG HN03 4 DEG H2S04 4 DEG H2S04 4 DEG H2S04 4 DEG	POTABLIQUII STEAM LIGUII STEAM LIGUII STEAM RVATION HOD 4 DEG C C TO pH<2 TO pH<2 TO pH<2 C TO pH<2 C TO pH<2 C TO pH<2 C TO pH<2 C TO pH<2 C	244 0.22 JIDS USET LE MATER IOX CLEANING FILTERS VOLUME REQUIRE (4) 60 (2) 1 L (3) 1 L 1 L P-C (3) 1 L 2 1 L AG 1 L P-C 1 L P-C 1 L P-C 1 L P-C 1 L P-C 1 L P-C 1 L P-C	244 0.18 USED ML AG AG AG	24-2. 0.17- VATER ELE PRE	241 0.10 LEVEL EQU CTRIC COI SSURE TRU	244: 0.09 UIP. USI NO. PROI MISDUCEI	243 0.10 ED BE	0.10	E
PEDOX (**COMPLETION OF PURGING): JIPHENT DOCUMENTATION DO JEGING SAMPLING PERISTALTIC PUR BAILER PVC/SILICON TUE IN-LINE/DISPOSA OTHER ANALYTICAL PARAMETERS VOC SVOC PEST/PCBs PAL INORGANICS (see notes) LEAD ONLY EXPLOSIVES TPHC TOC ANIONS TSS ONLY H20 QUALITY (see notes)	253 774 NEGUTIAN ISCUERSIBLE PLESTIBLE PLEST	PRACTION CODE FRACTION CODE VP MS EC M LC O S C S	N PRESE HET HCL, 4 DEG 4 DEG HN03 HN03 4 DEG H2S04 H2S04 4 DEG HN03 4 DEG H2S04 4 DEG H2S04 4 DEG H2S04 4 DEG	POTABLIQUII STEAM LIMBER OF RVATION HOD 4 DEG C C TO pH<2 TO pH<2 TO pH<2 C TO pH<2 C TO pH<2 C TO pH<2 C TO pH<2 C TO pH<2 C TO pH<2	244 0.22 JIDS USET LE WATER HOX CLEANING FILTERS VOLUME REQUIRE (4) 60 (2) 1 L (3) 1 L 1 L P-C (3) 1 L 2 1 L AG 1 L P-C 1 L P-C 1 L P-C 1 L P-C 1 L P-C 1 L P-C 1 L P-C 1 L P-C	244 D. 18 SUSED SAM AG AG LUBE	242_ 0.17- WATER ELE PRE:	241 0.10 LEVEL EQU CTRIC COI SSURE TRU	244: 0.09 UIP. USI NO. PROI MISDUCEI	243 0.10 ED BE	0.10	E

PROJECT USAEC - FT. DEVENS		FIELD SAMPLE MU	SER M X 5	7 1 Z X	STUDY AREA	AOC 57
SITE ID 57M-96-	124	SITE	TYPE WELL		SAMPLING !	1/30/9/
10/2/96 1115		JOB MU	MBER 09144.	08	FILE	TYPE CGW
ACTIVITY START 11:22 END	:24				WEA	THER SUMY LOW GOY
WATER LEVEL / WELL DATA			ECTIVE	F	PROTECT!	
	EASURED [ROM GROUND)			
WATER DEPTH 4.98 FT	GAL/VC		ELL INTEGRITY: ROT. CASING SECT	RE YES	O N/A	WELL 2 INCH
HEIGHT OF WATER COLUMN 10,17 FT	8 TOTAL	GAL PURGED M	ONCRETE COLLAR I ELL LOCKED VC WELL CAP	NTACT C		LT_INCH
11.68 gal/ft (4") (5,08) 0.9 gal/ft (1.PID REA	DINGS: AMBIENT		WELL MOUTH	PPH		
5 gal/ft PID REA	5,96 6.0	6.05 6.0	6 604 6.1	2 6,12	6110	
PURGE DATA TIME	1150 1155	1200 1205	1210 1213	1218 1	1221 1224	1227
GALLONS		2.3 2.4	2.5 3.0	3,3	3.4 3.5	SAMPLE OBSERVATIONS 3.8
PUMPING RATE (GPM)	10 PUL 50 MI	750 MA 750 M		7 750 77 7	50 04 750 M4M	CLEAR 'M
TEMP, DEG C	140 13.8	13.6 13.6	13,5 13.5	13.5 /	34 13.4	COLORED 13.4
pH, UNITS OPH PAPER	5,15 5,12	5,09 5,13	+		5.14 5.15	10000 5,15
SPECIFIC CONDUCTIVITY, umhos/cm			0.72 0.72		1.74 0.75	OTHER (SEE NOTES), 75
TURBIDITY, ntu	87 98	258 330	390 310	252	287 395	244
REDOX (COMPLETION OF PURGING)	: 230 (215+1-		187 201	214	214 205	200
JIPHENT DOCUMENTATION DO	1.35 0.69	1	0.67 0.7	0 0118 0	129/0,26	10.
. IRGING SAMPLING	EQUIPMENT	ID DECOM F	LUIDS USED	WATER LEV	EL EQUIP. USE	d
│ │ │ │ PERISTALTIC PU	MP ISCO# ERSIBLE_PUMP_	- LIQU			RE TRANSDUCER	
BAILER	∐2 " ∐4"	STEA	M CLEANING	U		Sample (ine
IN-LINE/DISPOS	BING ABLE FILTER			1		Sample Time
OTHER		NUMBER	OF FILTERS USED			
AMALYTICAL PARAMETERS	METHOD FRACT MUMBER COX	TION PRESERVATION DE METHOD		WPLE S DLLECTED	AMPLE BOTTLE	ID NUMBERS BOTTLE
□ voc □ svoc	UN20 VI		C (4) 60 ML			J
SVOC PEST/PCBs	UN18 MS		(2) 1 L AG (3) 1 L AG			
PAL INORGANICS (see notes)	UH13	и ниоз то pH<	2 1 L P-CUBE			
LEAD ONLY EXPLOSIVES	SD20 I	•	2 (3) 1 L AG			
	UM32					<i>J</i>
TPHC TOC	7700.) H2SO4 TO pH	<2 1 L AG			
ANIONS	TF22		<2 1 L P-CUSE	H		<i>J,</i>
		: 4 DEG C 1 HMO3 TO pH<	1 L P-CUBE 2 1 L P-CUBE			
TSS ONLY	3.00.	4 DEG C	1 L P-CUBE			J
H20 QUALITY (see notes)		N2SO4 TO PH	<2 1 L P-CUBE		<i>_</i>	
		HINOS TO PH	2 1 L P-CUBE			<i>J</i>
			(1) 4 02			<i></i>
COLIFORM	303, 909	4 DEG C	STERILE			<i></i>
NOTES (1) PURGING COMPLETE UME (2) PAL INORGANICS: ICP	N 5 WELL VOLUME METALS (SS10); F27): TION (TF26	S HAVE BEEN PURGE AS (SD22); SE (S): NIT (TF22); CL	D AND WHEN WATER D21); TL (SD09) /SO4 (TT10); TS	: 30 (3020):	PB (3UCU/; M	(3001/-
NOTES (1) PURGING COMPLETE WHE	N 5 WELL VOLUME METALS (SS10); F27): TION (TF26	S HAVE BEEN PURGE AS (SD22); SE (S): NIT (TF22); CL	D AND WHEN WATER D21); TL (SD09) /SO4 (TT10); TS	: 30 (3020):	PB (3UCU/; M	(3001/-

	Supplied to the supplied to th			. :		ant
PROJECT USAEC - FT. DEVENS		FIELD SAMPLE MAN	BER MX5	2 1 3 X J st	UDY AREA/AOC	10/2/96
TE 10 5 7 M - 9 6 -	131	SITE T			AMPLING DATE	9/30/76
ACTIVITY START 11:26 END	1:29	JOB NUM	BER 09144	-08	FILE TYPE	CGN
WATER LEVEL / WELL DATA WELL DEPTH 15 17 FT ME	ASURED TOP (V-2-12-	CTIVE G STICK-UP ON GROUND)	1	PROTECTIVE CASING/WELL DIFF	- FT
WATER DEPTH 4.96 FT	STORICAL		LL INTEGRITY:	YES NO NA	MELL	
HEIGHT OF MATER COLUMN 10, 16 FT	NA GAL/VOL TOTAL GA	L PURGED WE	OT, CASING SECU NCRETE COLLAR II LL LOCKED C WELL CAP		DIAMETER	4 INCH INCH
1.68 gal/ft (4") 5.08 gal/ft 422 PID READ	INGS: AMBIENT AI		WELL MOUTH	PPN	•	
Tarlmy Level 4.16	5.40 5.36	5,45 5,43	5.39 5.44		,	
PURGE DATA YOUNG	2:30 235	240 245	250 255	300 3:05	3.70	
GALLONS	Trickle = 50 mg	250. 250	1.2 1.4	1.6 1.8		BSERVATIONS
PUMPING RATE (GPM)		MYM MYM	aym		CLEAR CLOUD	۲
PH, UNITS OPH PAPER	141 1416	5.69 5.57	14.2 14.2	14,1 1411	14.0 COLOR	
	5.68 5.63	3/11 21	5.58 5.58		OTHER	(SEE MOTES)
SPECIFIC COMDUCTIVITY, umhos/cm TURBIDITY, ntu	- 110 -110		.112 .1/2	-112 111	1111 Rate	250 " SAIL
EDOX (a CONTESTIBLE OF PORTURE):	136 105	100 64	53 65	45 2542	48	
JIPMENT DOCUMENTATION	SIBLE PUMP	DECON FLU POTABL LIQUID STEAM	E WATER	WATER LEVEL EQUIPMENT OF THE PRESSURE TRA	JIP. USED HD. PROBE NISDUCER SOV	wolline
	ETHOD FRACTIO	N PRESERVATION METHOD		PLE SAMPLE LECTED	BOTTLE ID NUMBE	RS BOTTLE
SVOC U PEST/PCBs U	M20 VP M18 MS H02 EC	HCL, 4 DEG C 4 DEG C 4 DEG C	(4) 60 ML (2) 1 L AG (3) 1 L AG			
PAL INORGANICS (see notes)	M D20 N	HNO3 TO pH<2 HNO3 TO pH<2	1 L P-CUBE			
	W19 LC W32	4 DEG C	(3) 1 L AG		/	<i>=</i> /
TPHC 4	18.1 0 15.1 0	H2SO4 TO pH<2	1 L AG		/	
	F22 S T10 C	H2SO4 TO PH<2	1 L P-CUBE	$H \longrightarrow f$		
3	10.1 N 60.2 C	HMO3 TO pH<2	1 L P-CUBE			
TSS ONLY 10 H20 QUALITY (see notes)	S C	H2SO4 TO pH<2	1 L P-CLIRE			
COLIFORM 3	03, 909	HNO3 TO pH<2 4 DEG C	1 L P-CUBE (1) 4 OZ STERILE			
OTES (1) PURGING COMPLETE WHEN S (2) PAL INORGANICS: ICP M H20 QUALITY: PO4 (TF2' ALL PARAMETERS COLLECT	ETALS (SS10); AS 7); TKN (TF26); I	(\$022); SE (\$02 IIT (TF22); CL/S	1); TL (SD09);	SB (SD28); PB (SD	20); HG (\$801).	

PROJECT USAEC - FT. DEVENS		FII	ELD SAM	PLE NUM	BER M	63	07X	(3 st	LIDY AREA/AOC AOC 57
SITE 10 G3M- 92-	07X]		SITE T	1				AMPLING DATE 9/30/9/
16/1 2:42		-		JOB MUM	BER 9/	44-0	8		FILE TYPE CON
ACTIVITY START 0:58 END	11:02					,			WEATHER Sumy MIGH LED'S
WATER LEVEL / WELL DATA		TOP OF		PROTE					PROTECTIVE
	MEASURED '	TOP OF	PYC		G STICK-U			FT	CASING/WELL DIFF. FT
WATER DEPTH 25.92FT	NA	GAL/VOL			LL INTEGR		YES	16 16	MELL 2 INCH DIAMETER AL INCH
HEIGHT OF WATER COLUMN 8.37 FT	9\$	TOTAL GAL	PURGED	UE.	NCRETE COI LL LOCKED		TACT	A F	L <u>l</u> inch
E1.68 gal/ft (4") gal/ft PID RE/		345	348		C WELL CA			u .	
Ligal/ft PID RE/	10 ings: Al	4BIENT AIR 25.96	0 25.97	2519	WELL MOUT	'H 0	PPH		
PURGE DATA TIME VOLUME	325	133 \$	25	351	354				
GALLONS	81	3	4	4.5	5				SAMPLE OBSERVATIONS
PUMPING RATE (GPM)	300	500 myn	500 14A	500 myn					CLEAR CLOUDY
TEMP, DEG C	15.3	14,9 1	4.7	14.6	14,4				COLORED
PH, UNITS OPH PAPER	6.04	6.03 6	201	6.01	6,01				□ opore
SPECIFIC CONDUCTIVITY, umhos/cm	\$308	.338,	343	1349	,350				2:55 (1555)
TURBIDITY, ntu	0	0	0	0	٥				3:55 (1555) SAMPLE TIME
REDOX (@ COMPLETION OF PURGING)	: 110	175	195	205	207				
JIPMENT DOCUMENTATION DOCUMENT	MP ISCO ERSIBLE PU D2"	#P 	um e	POTABL LIQUIN STEAM	7.30 JIDS USED LE WATER HOX CLEANING FILTERS	used _	ELEC		IIP. USED ID. PROBE MISDUCER
ANALYTICAL PARAMETERS	METHOD	FRACTION	PRESER		VOLUME	SAIP			BOTTLE ID NUMBERS BOTTLE
_	NUMBER	CODE	METH		REQUIRED		ECTED		2 TO SIMP MGMNT
VOC SVOC PEST/PCBs	UN20 UN18	VP MS	HCL, 4 4 DEG		(4) 60 M	ac ['-	<u>S</u> YS	TEM J
☐ PEST/PCBs	บ ห 02 บห13	EC	4 DEG	С	(3) 1 L	AG [] _		
□ a		N	HIMOR T	0 ~4.2		BE	7 —		
PAL INORGANICS (see notes)	cn 20	M			1 L P-CU	Г	1 -	<i>-</i> -	
PAL INORGANICS (see notes) LEAD ONLY EXPLOSIVES	SD20 UN19	N LC		0 pH<2	(3) 1 L				
TPHC	UW19 UW32 418.1	LC O	HNO3 T 4 DEG H2SO4	0 pH<2 C TO pH<2	(3) 1 L				
EXPLOSIVES	UW19 UW32	£C.	HN03 T 4 DEG H2S04 H2S04	0 pH<2 C TO pH<2 TO pH<2	(3) 1 L	AG [
EXPLOSIVES TPHC TOC ANIONS	UW19 UW32 418.1 415.1 TF22 TT10	LĈ 0 0	HNO3 T 4 DEG H2SO4 H2SO4 H2SO4 4 DEG	0 pH<2 C TO pH<2 TO pH<2 TO pH<2 C	(3) 1 L 1 L AG 1 L AG 1 L P-CU 1 L P-CU	AG C			
EXPLOSIVES TPHC TOC ANIONS TSS ONLY	UW19 UW32 418.1 415.1 TF22	LC O O S C N C	HNO3 T 4 DEG H2SO4 H2SO4 4 DEG HNO3 T 4 DEG	0 pH<2 c TO pH<2 TO pH<2 C O pH<2 C	(3) 1 L 1 L AG 1 L AG 1 L P-CU 1 L P-CU 1 L P-CU 1 L P-CU	AG E BE BE BE BE			
EXPLOSIVES TPHC TOC ANIONS	UW19 UW32 418.1 415.1 TF22 TT10 310.1	EC 0 0 5 C N	HMO3 T 4 DEG H2SO4 H2SO4 4 DEG HMO3 T 4 DEG H2SO4 4 DEG	O pH<2 C PH<2 TO pH<2 TO pH<2 C PH<2 C PH<2 C	(3) 1 L 1 L AG 1 L P-CU 1 L P-CU 1 L P-CU 1 L P-CU 1 L P-CU	AG BE BE BE BE BE			
EXPLOSIVES TPHC TOC ANIONS TSS ONLY	UW19 UW32 418.1 415.1 TF22 TT10 310.1	LC O O S C N C S	HMO3 T 4 DEG H2SO4 H2SO4 4 DEG HMO3 T 4 DEG H2SO4 4 DEG	O pH<2 C PH<2 TO pH<2 TO pH<2 C PH<2 C TO pH<2 C O pH<2	(3) 1 L 2 1 L AG 2 1 L P-CU 1 L P-CU 1 L P-CU 1 L P-CU 1 L P-CU	AG BE BE BE BE BE BE			

. •

Project Number:			Date:5];^ _ Signature of Sampl	•	E. Roba-
SOIL SAMPLE Field Sample No. Solution Depth of Sample Selection Field GC Data: [] Field Duplicate	ce below	[V Hand A V S.S. Sp [] Shovel [] Hand Sp [] Alumin	Used For Collection: Auger Spoon (deep only) Spoon um Pans	Soil Type {	; :
≥ at ~1f		Type Of Sa [V] Discret [] Compo Sample Ob [] Odor _	ample Collected:	ر Sample Lo	See map
Analysis VOC SVOC Pest/PCB PAL Inorganics Explosives TPHC Bead Only TOC	Method Number LM19 LM18 LH16 LH10 See Below LW12 418.1 JD17 415.1 1311	Code R SV (2): SS (1): SS SS SS SS	Volume Preservation dequired Method 20Z AG 4 DEG C 16 OZ AG	· -	Sample Bottle ID Numbers /
I TOLP IN EPHINPH		Time	Donlla	PiD	Descrip.
[] TCLP レグ EPH/VPH PAL Inorganics: ICP Meta	Same 1P SF57010 SF57010	0 0900 0 0917	Depth 0-6" bgs 5 HIS' bgs ny Sample a	1.0 (momentary	silt for sand, sit

SURFACE SOIL SAMPI	LE FIELD DATA RECORD
Project: DEVENS	Site: <u>AUC 57 Area 2</u>
Project Number: 09144.08 Site Identification: 575-98-02 X	_ Date: 5/19/198
Site Identification: $575-98-02 \times$ Time: Start: 1035 End: 1050	Signature of Sampler: Wancy E. Roka
SOIL SAMPLE	
Field Sample No. See Jelow [Mand At	Used For Collection: Soil Type: uger (dep っい) [] Clay
[] Shovel	lit Spoon [] Sand [] Organic
Depth of Sample See believ [1/Hand Sp	m Pans
Field GC Data: [] Field Duplicate Collected [] SS Buck Duplicate ID [V	
Type Of Sar	mple Collected: Sample Location Sketch:
[\forall Discrete [] Compos	
$\underline{V} = \sim i \text{ ft bgs}$ Sample Obs [] Odor _ [] Color _	servations:
(+ rising?) [] Odor_	
J - [1	
SAMPLES COLLECTED Method Fraction V.	olume Preservation Sample Sample Bottle
Analysis Number Code Re	equired Method Collected ID Numbers
[V] SVOC LM18 SS (1) 1	20Z AG 4 DEG C [Y/
Pest/PCB LH16 SS LH10	
[✔] PAL Inorganics See Below SS [] Explosives LW12 SS	
[**TPHC 418.1 SS [] Lead Only JD17 SS	
[] TOC 415.1 SS	
I XTCLP 1311 SS	4 DEG C/methanoile
PAL Inorganics: ICP Metals (JS16; AS (JD19); SE (JD15); TL (JD24); SB (JD	(NE)
NOTES/SKETCH	
	gs) (ppm)
Samp ID Time De	pth PID Obs.
	-0.5' 8.5 (meth) sandy silt, org., ors
SF570201 1045 1	
Off-site sample colle	pat 0-05'10-
Utt-site sample colle	cted for 0-0.5' bgo
(QST lab# HLAD)	115*2)
SX 570200	

FIGURE 4-7
SURFACE SOIL SAMPLE DATA RECORD
PROJECT OPERATIONS PLAN
FORT DEVENS, MASSACHUSETTS
ABB Environmental Services, Inc.-

Project: Devens Project Number: 09144.08 Site Identification: 575-98-03x	Site: AOC 57 Firea 2 Date: 5/19/98 Signature of Sampler: Warry E. Roka
Field Sample No. See Frow Depth of Sample See Frow Field GC Data: [] Field Duplicate Collected Duplicate ID Y = A [.5' bg	Equipment Used For Collection: [Hand Auger (deep only)
SAMPLES COLLECTED Method Fraction Analysis Number Code [V] VOC LM19 SV [V] SVOC LM18 SS [V] Pest/PCB LH16 SS LH10 LH10 SS [V] PAL Inorganics See Below SS [V] Explosives LW12 SS [V] TPHC 418.1 SS [V] Lead Only JD17 SS [V] TOLP 1311 SS [V] EPH/VPH PAL Inorganics: ICP Metals (JS16; AS (JD19); SE (JD15); TL (JD15);	Required Method Collected ID Numbers
Samp ID Time SF 570300 1120 SF 570302 1130 Off-site sample 2-2.5 ft. bgo (1) QST lab #=	(fl togs) (ppm) Depth PID Obs. 0-0.5' 0.3 Sandy silt, little or 2-2.5' 1.3 drk brown sandy s w) org (wood (SX570302) (ollected from Petr. odor). HLADVIS*3

	SURFA	CE SOIL SAN	IPINE ETEN	D DATA RECO)RD	
Project:	DS:MU2		Site:		7 Area 2	
Project Number:	09144.08		Site Date:		THILLY A	
Site Identification:	CB 575-98	1-04X	Date.		<u> </u>	_
Time: Start:	200 1150 End:	1200		ature of Sampler:	Nancy E. Rote	\hat{a}
				-		
SOIL SAMPLE	sep below		ent Used For Coi		Soil Type:	
Field Sample No.	see below see below		. Split Spoon	ef or.eg	[] Clay [Sand	
Depth of Sample	see below	[]Sho	vel d Spoon		[] Organic [] Gravel	
Dopar or Campio		[] Aluı	ninum Pans		Colave	
Field GC Data: [] Field	Duplicate Collected	[]\$S [4]	Bucket ろろ しついし	(deep onl	(u_i)	
Supricate			Sample Collecte		Sample Location Sketch:	
	\circ	Disc	crete		1 Yes 1 No see may	_
<i>ي</i> لا	1 A. bgo	[] Con	nposite		IN No see may	<i>D</i>
	3		Observations:			
		[] Cold	r or			
		[]				
SAMPLES COLLECTED						
Analysis	Method Number	Fraction Code	Volume Required	Preservation Method	Sample Sample Bottle Collected ID Numbers	
√ voc	LM19		2) 20Z AG	4 DEG C	[M	/
SVOC	LM18		1) 16 OZ AG		[Y]	<u> </u>
✓ Pest/PCB	LH16 LH10	SS				
PAL Inorganics Supplemental Page 1	See Below LW12	SS SS			M//	<u>;</u>
TPHC	418.1	SS				
[] Lead Only	JD17	SS	V			<u>'</u> ——
[] TOC [] TCLP	415.1 1311	SS SS	•	4 DEG C/March	AN TIME	
PAL Inorganics: ICP Meta	ls (JS16; AS (JD19); SE (J	D15); TL (JD24); SB	1) 16 OZ AG (JD25); PB (JD1	7): HG (JB10).		
		. , = ,, ==	. ,, - ,			
NOTES/SKETCH			.3	(coo)	~ \	
0	7	pec.	th	(Pr. ()	065.	
Samp_	ID lime	(44, 8	<u>(20)</u>	PID		
SF570	1155	0 🖺	86,5	0 .3	pourly gr, sa	ind
ال ال ال	1700	•				
SF570	401 1200	1	-1.5	0,3	poorly gr so	- CV
		5x57040i)			
OF- <	ite sampl	e/(oilo	cted	from	1-1.5 A bgp.	
					т 590.	
QST	lab #	HIAD	V15 *	Ц	V	
		116110	· (J A			

SURFACE SOIL SAMPLE	E FIELD DATA RECORD
Project: Devens Project Number: 09144.08 Site Identification: 6x 575-98-05X Time: Start: 1355 End: 1410	Site: ADC 57 Area 2 Date: 400 5/19/98 Signature of Sampler: Wancy E. Roka
Field Sample No. See below [7] Hand Aug [7] J.S. Split See below [7] Field Sample See below [7] J.S. Split See See See See See See See See See Se	[] Organic on [] Gravel Pans
Type Of Samp [Y Discrete [Y Discrete [Y Composite Sample Obser [Y Color Y [Y Color Y]	1 Yes see map
SAMPLES COLLECTED Method Fraction Volta Analysis Number Code Requirement [V] VOC LM19 SV (2) 202 [V] SVOC LM18 SS (1) 16 (1) 16 (1) [V] Pest/PCB LH16 SS LH10 [V] PAL Inorganics See Below SS SS [V] PAL Inorganics LW12 SS SS [V] TPHC 418.1 SS SS [V] TPHC 418.1 SS SS [V] TOC 415.1 SS (1) 16	AG
SamplD Time (7) (8) \$570500 1353 SX570502 1410	PID Obs STE 4. bogo) (ppm) Obs STE 0-0.5 well graded sand of the to course rocky fill from o.5-3 ft bgo (me) (me) (me)

FIGURE 4-7 SURFACE SOIL SAMPLE DATA RECORD **PROJECT OPERATIONS PLAN** FORT DEVENS, MASSACHUSETTS

ABB Environmental Services, Inc.—

	SURFA	CE SOIL S	AMPLE FIEL	D DATA REC	ORD		
Project: re	vens		Site:	AUC	57 1	irea 2	
Project Number:	09144	S		5/19	198		
Site Identification:	575-99	- 00X					
Time: Start:	150 End:	10:00	Signa	ature of Sampler	. War	ney E	Roka
SOIL SAMPLE Field Sample No.		[1]	jpment Used For Col Hand Auger (حُرُّث) S.S. Split Spoon Shovel	lection: epunly)		il Type: Clay Sand Organic	
Depth of Sample	Ze belaw Junicate Collected	į į	Hand Spoon Aluminum Pans ŞS Bu <u>cke</u> t		•	Gravel	
· · ·	ID	iv.	32 mm	(deep only	y)		
五 ~ Q, P	gs	[V] [[] (Sam [] (e Of Sample Collecte Discrete Composite nple Observations: Odor Color		f	mple Location (Yes YNO S'EQ	
SAMPLES COLLECTED	Method	Fraction	Volume	Preservation	Sample	Sam	ple Bottle
Analysis	Number	_Code	Required	_Method_	Collected		Numbers
[*] voc	LM19	sv	(2) 2OZ AG	4 DEG C	[4]	/	
[*] svoc	LM18	SS	(1) 16 OZ AG		راساً ا	/	//
[/ Pest/PCB	LH16	SS	1		[44]	/;	',',
PAL Inorganics	LH10 See Below	SS					',',
[] Explosives	LW12	SS			[]	',	— <i>;</i> —— <i>;</i> -—
TPHC	418.1	SS	į		الموا		
[] Lead Only	JD17	SS	+		ίi	/	
[] TOC	415.1	SS	▼		.[].		!
IN EPHIVEH	1311	SS	(1) 16 O7 AC	4 DEG C+meth	Cua [V]	/	_/
AL Inorganics: ICP Metals	(JS16; AS (JD19); SE	(JD15); TL (JD24);	(1) 16 OZ AG SB (JD25); PB (JD1	7); HG (JB10).			
NOTES/SKETCH							
S	amp 1D	Time	Depth	PID	Olos		
		~			Orac	~ }	42 2000
0 ;	570600	09535	0-6"				iome SH
Sf	570601	icio	i-1.5′	1.7 ppm	San	d silt	rong u
				17.5 ppinant	9	90.0	- J'
H	ole			~20ppm	7		
id Co	oilected	off-site	e Samp		n i-	1.51 b	
	ist lab \$					_	S
`		•					

FIGURE 4-7
SURFACE SOIL SAMPLE DATA RECORD
PROJECT OPERATIONS PLAN
FORT DEVENS, MASSACHUSETTS
ABB Environmental Services, Inc.-

Project Number: OPI HILLON Size Identification: 575-98-07X Time: Start: IH25 End: Signature of Sampler: IMARCU E. Rollon Soil Type: Indiana Angre (2227 printy) ISS. Signature of Sampler: IMARCU E. Rollon ISS. Signature of Sampler: IMARCU E. Rollon IMARCU E. Rollon ISS. Signature of Sampler: IMARCU E. Rollon ISS. Signature of Sampler: IMARCU E. Rollon ISS. Signature of Sampler: IMARCU E. Rollon ISS. Signature of Sampler: ICANOCU E. Rollon ISS. Signature of Sampler: ICANOCU E. Rollon IMARCU ISS. Signature of Sampler: ICANOCU E. Rollon IMARCU ISS. Signature of Sample Collection IMARCU ISS. Signature of Sample Collection ICANOCU ISS. Signature of Sample Collection ICANOCU ISS. Signature of Sample Collection ICANOCU ISS. Signature of Sample Collection ICANOCU ISS. Sample Collection ICANOCU I	Project:		ACE SOIL SAM	Site:	AUC 57	Area 2	
Site Identification: 575-98-07X Time: Start: 142.5 End: 1500 Signature of Sampler: 1 Manage E. Rolla SOIL SAMPLE SOIL SAMPLE SEQUENCE IN SOIL TYPE: 100 Signature of Sampler: 1 Manage E. Rolla Depth of Sample No. See below I Sample Soon I Soon	-		08		. 1.	4.1.4.3.73	-
SOIL SAMPLE Field Sample No. SCE Science Field Sample No. SCE Science Depth of Sample Science Depth of Sample Science Depth of Sample Science Depth of Sample Science Depth of Sample Science Depth of Sample Science Depth of Sample Depth of Sample Depth of Sample Science Depth of Sample Depth of Sample Depth of Sample Collected at Sxs70700 Off Site Sample Collected at Sxs70700 Off Site Sample Collected at Sxs70700 Off Site Sample Collected at Sxs70700	Site Identification:	575-98	-07x			0.0	- 0
Field Sample No. See below Depth of Sample See below Depth of Sample See below Field GC Data: // Field Dunicage Collected Dunicate 10 Sp 57 0700 (QST 1ab. # HLADVIS * 27) Field GC Data: // Field Dunicage Collected Dunicate 10 Sp 57 0700 (QST 1ab. # HLADVIS * 27) Field GC Data: // Field Dunicage Collected Dunicate 10 Sp 57 0700 (QST 1ab. # HLADVIS * 27) Field GC Data: // Field Dunicage Collected: // Discrete //	Time: Start:	<u>f25</u> Enc	: <u>1500</u>	Signat	ure of Sampler:	Manay E.	cotea -
Analysis Number Code Required Method Collected ID Numbers IN VOC LM19 SV (2) 20Z AG 4 DEG C IN SVOC LM18 SS (1) 16 0Z AG IL PERIPOB LH16 SS IL Explosives LW12 SS IL Explosives LW12 SS IL Explosives LW12 SS IL TOC 418.1	Pield Sample No. Depth of Sample Field GC Data: [V] Field D Duplicate I	ee below uplicate Collected D SD 57 07 00 ab. # HLAD	[] Hand [] S.S.! [] Shov [] Hand [] Alum [] ISS B []	nt Used For Colle Auger (2) Split Spoon el Spoon inum Pans ucket Sample Collected ete cosite Dbservations:	ction: Ponly (shallow in deep)	Soil Type: [] Clay [] Sand [] Organic [] Gravel Sample Location Sk	
Samp ID Time (ft. bos) (ppm) Olos. (S\$\$570700 1430 0-0.5 7.5 drk br. org. and si S\$\$570701 1500 i-1.5 ~28 organic siH, bu (Hot + simmy) wefi - Off-site sample collected at S\$\$570700 (0-0.5 ft bgo). - QST lab #= HLADVIS *7 - Off-site sample collected at S\$\$570701	Analysis VOC SVOC Pest/PCB PAL Inorganics Explosives TPHC Lead Only TOC	Number LM19 LM18 LH16 LH10 See Below LW12 418.1 JD17 415.1 1311		Required) 2OZ AG) 16 OZ AG	Method C 4 DEG C 4 DEG C/N 20H	Ollected ID Nu [] / / / / / / / / / / / / / / / / / /	í
QST lab # = #LADVIS* SURFACE SOIL SAMPLE DATA RECORD	San St5 St5 - Off. Sit - Off. Sit	70700 70701 He sam 0-0.5 A lab #= e samp 1-1.5 A b	1430 1500 Ple colle bgo). HLAD le colle	0-0.5 i-1.5 cted	(ppm) 7.5 n. 28 (Hut +) Simmy) at SX570	drk br. o organi vve 10700	c si.H, bia

	SURFA	CE SOIL SAM	PLE FIELD	DATA RECO	DRD	
Project:	Devens		Site:	AOC 5	57 Area	2
Project Number:	09144.0		Date:			
Site Identification:		575-98-	<u>08</u> X		1 100	y E. Rofa
Time: Start:	595 End:		Signatu	ire of Sampler:	Dianu	y L. Kora
SOIL SAMPLE	Co below	Equipme	nt Used For Collec	tion:	Soil Typ	e:
Field Sample No.	Sce below	[] S.S. S	Auger (deep Split Spoon	p unity	[] Clay [] Sand	
Depth of Sample	Sce below	[] Shov			[] Orga [] Grav	
Field GC Data: [] Field	Dunlingto Collected	i ice o	num Pans ucket			
	e ID	ivi_s	'S bowl (<u>shallau</u> a	nly)	
		Type Of S	Sample Collected:		Sample	Location Sketch:
メ ミル 6	1561	[] Comp			No.	see map
(0.5 ft bgp		Observations:			`
	·	[] Color				
		[]				
SAMPLES COLLECTED	Method	Fraction	Volume F	Preservation	Sample	Sample Bottle
Analysis	Number	_	Required F	Method_	Collected_	ID Numbers
[4 VOC [4 SVOC	LM19 LM18	•) 2OZ AG) 16 OZ AG	4 DEG C	(1) .	
Pest/PCB	LH16	ss	, 10 02 Ad		L	
PAL Inorganics	LH10 See Below	SS				
[] Explosives [TPHC	L W 12 418.1	SS SS			[] - [v] -	
[] Lead Only [] TOC	JD17 415.1	SS SS	♦			
EN EPH/VPH	1311	SS) 16 OZ AG	4 DEG C/MeOl	1 W	
PAL Inorganics: ICP Meta	als (JS16; AS (JD19); SE (JD15); TL (JD24); SB (JD25); PB (JD17);	HG (JB10).		
NOTES/SKETCH						
			<u>,</u>	-O. x		
Q		 -	Depth	PID	· · ·	Obs.
<u>ک</u>		Time	(A. 695)	(Apm	ے (۱	
(4)2	×570800	1550	0-0.5	17	D	rzbrown org. + s
	×570801	1660	1-1.5	0,3	c	ame, ut sand
(R)	F	,		O, D		at n 1.59 bac
						(moist)
~				_		
011-	site sam	ple col	lected	at S	×5708	500
(0	0.5'bg)	\ }	****	-		
•		<i>/</i> ,				
QS	T lab#	= HLA	PIVIC	£9		
			V / 3	70		
- D	ense roc	A MIW			F	IGURE 4-7
			SURFAC	CE SOIL SAI		
			,		T OPERATI	•
				ORT DEVEN ——ABB Er		Services, Inc.

	SURFAC	E SOIL SAMPL	E FIELD DA'	TA RECORD		
Project:	devens		Site:	AOC 57	Area 2	
Project Number:			Date:	2 (
Site Identification:	575-98-0		-		• •	-02
Time: Start:	600 End: _	1625	Signature o	f Sampler:	Many 1	KOKU"
SOIL SAMPLE	Cen helm		sed For Collection:	Custon.	Soil Type:	
Field Sample No.	See below	[] S.S. Split		Jr. reg)	[] Clay [] Sand	
Don't of Comple	See below	[] Shovel [\(\frac{1}{2} \) Hand Spo			[] Organic [] Gravel	
Depth of Sample	<u> </u>	[] Aluminun	n Pans		Carava	
Field GC Data: [] Field		[] SS Bucke	haul (s	hallar or	rica	
Duplicat	e ID					- Cleatab
		Type Of Sam [√ Discrete	ple Collected:		Sample Locatio	
V - 1		[] Composit	te		INO SEE	map
<u> </u>	iff bgs	Sample Obse	ervations:			ţ
		[] Color				
SAMPLES COLLECTED	Method	Fraction Vo	lume Prese	ervation Sam	nple Sa	ample Bottle
Analysis	Number			ethod Colle	•	D Numbers
[× voc	LM19	- ' ' '		EG C	√ —;	
[→ SVOC [→ Pest/PCB	L M 18 LH16	SS (1) 16 SS	OZ AG		1 — ;	
[N Legalon	LH10	~		į	•	
PAL Inorganics	See Below LW12	SS SS		[v	? — <i>-/</i>	
[] Explosives [**TPHC	418.1	SS		ાં .	i <u> </u>	
[] Lead Only	JD17	SS SS	♥	[]	
[] TOC L] TCLP	415.1 1311	SS	4 D	EGC/M-20H h	<i>}</i> = 1	
PAL Inorganics: ICP Met	als (JS16; AS (JD19); SE (J	1) 16 (1) 15): TL (JD24): SB (JD2	S OZ AG 25); PB (JD17); HG	(JB10).		
NOTES/SKETCH						
		_	_ 3	PID		
			oth.	, , ,	\sim 1	
Sam	PLD Tim	; (A	bgg)	(ppm)	06	2
(A) E	1019					
(PSX57)	0900 160	5	-0,5	9.4		
SXET	0901 16	20 1	-2	00	Black	t org, inc
3407	0 101	1	- 2	0.8	bu h	walm Ce
mi					9	rown fsc
•				,		
0A2=	site Jam	nlo toi.	10ctor	h at	Cv 60	~~
					Sx57	0100
	(c-0,5 Ai	gs)				
		0-				
0	1-14.	115 0-	3 m 11: 5 m			
0001	lab#=	HLHDV	12*10			
						JRE 4-7
Der	se root 1	nat	CHEEACE	SOIL SAMP		
(~ i	H" Hairla	a modilión	GURFACE	PROJECT O		
asc	t" thick)	11. 6	FOE	RT DEVENS,		
	~~ 13 Ot	450	- FUF		onmental Ser	

9505005SL 2 (i.e., spongy stepping)

		ACE SOIL SAM	IPLE FIELL				
Project:		0 K	Site: _ Date:	=: 1		ea 2	
Site Identification:	575-98	-10X		-		- 0	
Time: Start:	530 End	1645	Signa	ture of Sample	r: <u>Ulam</u>	y t. Ko	5100
SOIL SAMPLE Field Sample No. Depth of Sample Field GC Data: [] Field in Duplicate	See below See below Duplicate Collected ID		nent Used For Colle nd Auger (ection:	Soil T []Cli []Sa []Or []Gr	ay nd ganic	
¥=	0.5 ff b	[\$\footnote{\psi} \text{Dist} \\ [] \text{Cor} \\ \text{Sample} \\ [] \text{Odd}			Sampl {] Ye [レナベ	e Location Sketch: s o SCP Ma	P
SAMPLES COLLECTED Analysis VOC Sylvoc	Method Number LM19		Volume Required (2) 2OZ AG	Preservation Method 4 DEG C	Sample Collected	Sample Bottle ID Numbers	
Past/PCB	LM18 LH16 LH10	SS	(1) 16 OZ AG 		THE REPORT OF	\	<u>/</u>
[] PAL Inorganics	See Below LW12	SS SS				/	<u>/</u>
[] Lead Only	418.1 JD17	SS SS	1		\M		<u> </u>
[] FOC [] JTCLP [V VPH / EVPH PAL Inorganics: ICP Metal	415.1 1311	SS SS	(1) 16 OZ AG 3 (JD25): PB (JD17	4 DEG C	e Other		
NOTES/SKETCH				<u></u>			
S\$57 S\$57	1001	Timé 1635 1640	Depth (ft bg 0-0.5 1-2		210* 20m) 13	Olos. Biack si Biack si wy sano	iltalon
* 100	nse roo	A mat	/n4"	Hoick		Let be	
00	eneura	00 cleat	-s of	H-0		(Somewall	That
(1	erlying .e., spo	ngry Sta	Epping))		00	
*	PD mo (reading	ufuncti 13 pom	oning		484DI E D.A.	FIGURE 4-7	
(N	(reading	ambient)		PROJE	CT OPERAT	TA RECORD TIONS PLAN ACHUSETTS	

FORT DEVENS, MASSACHUSETTS
——ABB Environmental Services, Inc.-

SURFACE SOIL	L SAMPLE FIELD DATA RECORD
Project: 180805	Site: <u>AOC 57 Area 3</u>
Project Number: 09144.08 Site Identification: MS 578-98-11X	Date: 5/20/98
Site Identification: MS 575-48-11X Time: Start: 1015 End: 102	~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~
SOIL SAMPLE Field Sample No. Sel Gelow Depth of Sample Sel Gelow Field GC Data: [] Field Duplicate Collected Duplicate ID	Equipment Used For Collection: Hand Auger (
$\underline{X} = \sim 3 \text{ ft. bgo}$ (see note below)	Type Of Sample Collected: [Discrete
Analysis Number Code Analysis Number Code MY VOC LM19 SV LM18 SS LH10 S	Volume Preservation Sample Sample Bottle
Samp 1D Time SF571100 1020 SF571103 1025	(ft logo) Depth Olos. 0-0.5 black, org., Sandy Silt 3-3.5 Sand, wet, poorly grade f-m, Light brown
* PID not working by look, odor, + y in MW-12 is ~2 f No offsite sample	off-site Judged / Samp. locations historical 1nfo. At logs (~15' N of 575-98-11) FIGURE 4-7 SURFACE SOIL SAMPLE DATA RECORD PROJECT OPERATIONS PLAN FORT DEVENS. MASSACHUSETTS

FORT DEVENS, MASSACHUSETTS

ABB Environmental Services, Inc.-

SURFACE SOIL S	AMPLE FIELD DATA RECORD
Project: Deven 5	site: Auc 57 Area 3
Project Number: 09144, 58	Date: 5/20/38
Site Identification: 57\$-98-12X	- I No man to Do
Time: Start: 1036 End: 1040	Signature of Sampler: <u>Nancy E. Roto</u>
Field Sample No. Ste Velow	uipment Used For Collection: Soil Type: Hand Auger (122) [] Clay S.S. Split Spoon [] Sand
Depth of Sample <u>SCL bCLC</u> W [V	Shovel [] Organic Hand Spoon [] Gravel Aluminum Pans
Field GC Data: [] Field Duplicate Collected [Duplicate ID	SS Bucket
$\underline{x} = -1$ ft, bop sa	per Of Sample Collected: Discrete Composite I No SCL TY:CLP mple Observations: Odor Color
SAMPLES COLLECTED	Volume Preservation Sample Sample Bottle
Method Fraction Analysis Number Code	Volume Preservation Sample Sample Bottle Required Method Collected ID Numbers
[] VOC LM19 SV	(2) 20Z AG 4 DEG C []//
[] SVOC LM18 SS [] Pest/PCB LH16 SS	(1) 16 OZ AG
LH10	
[] PAL Inorganics See Below SS [] Explosives LW12 SS	
[] TPHC 418.1 SS	
[] Lead Only JD17 SS [] TOC 415.1 SS	▼
[] TCLP 1311 SS	4 DEG C []//
PAL Inorganics: ICP Metals (JS16; AS (JD19); SE (JD15); TL (JD24	(a); SB (JD25); PB (JD17); HG (JB10).
NOTES/SKETCH	
Con 1D Trois	Depth (Abgo) Obs.
Samp 1D Time	
SF571200 1035	0-0.5 black, org. silt-root mo
	1-1.5 sand wet parly grad
SF571201 1040	the same of the sa
	i-1.5 sand wet, parly grad fm, light brown
work and workling	, - off site sample locis chosen
of Lin Lot morteur	- off-site sample loc.s chosen historical info.
by sight, odor, t	r historical 14 to.
J O	
No off-site samp	oll collected FIGURE 4-7
· · · · · · · · · · · · · · · · · · ·	SURFACE SOIL SAMPLE DATA RECORD
	PROJECT OPERATIONS PLAN
	FORT DEVENS, MASSACHUSETTS
	ABB Environmental Services, Inc.

SURFAC	E SOIL SAMPLE	FIELD DATA	RECORD		
Project: Neven 3		Site: AC	oc 57 +	frea 3	
Project Number: 09144.09	ζ	Date:	5/20/98		
Site Identification: 575-9%-13			7	1- 0 f	≥ 1
Time: Start: 1045 End:	<u> [0535</u>	Signature of Sa	mpler:\ <u>\@\</u>	ry to KOK	A
SOIL SAMPLE Field Sample No. See below Depth of Sample See below Field GC Data: [] Field Duplicate Collected Duplicate ID	[Hand Aug	ed For Collection: er (dep) Spoon On Pans Dowl (dep	Soi [] [] [] on'w] Sar	Type: Clay Sand Organic Gravel mple Location Sketch: Yes No Sel Man	0
SAMPLES COLLECTED Analysis VOC LM19 SVOC LM18 V Pest/PCB LH16 LH10 PAL Inorganics See Below Explosives W12 TPHC TPHC 1 Lead Only TOC TCLP TCLP TCLP PAL Inorganics: ICP Metals (JS16; AS (JD19); SE (JD	Fraction Volume SV (2) 200 SS (1) 16 G SS SS SS SS SS SS SS SS SS SS SS SS S	vired Method Z AG 4 DEG C DZ AG 4 DEG C	Collected IT IT IT IT IT IT IT IT IT IT IT IT IT	Sample Bottle ID Numbers /	
Samp ID SF571300 SF571301	1050 1055	Depth (ft. logo) 0-0.5 1-1.5	brown and re oran	m, org. + sa moist	4
* PID not wo chosen by offsite sample (1-1.5 ft. bg QST lab# = HLA	y stafit, a collected p)	odor, + h at SX571 SURFACE SO PRO FORT D	iistorical 301 IL SAMPLE D OJECT OPER DEVENS, MAS	FIGURE 4-7 PATA RECORD ATIONS PLAN SACHUSETTS	

	SURFACE	SOIL SAMPLE F	TELD DATA	RECORD		
Project: De	vens			oc 57	Area 3	
Project Number:				20198		
Site Identification:	575-98-14X	_			AC 2-	50
Time: Start: 17	10 End:	1120	Signature of S	ampler:	Yancy E.	Korg A
SOIL SAMPLE						
	see below	Equipment Used	For Collection: (deep 0)	Cula	Soil Type:	
Field Sample No.	30000	[] S.S. Split Spo	on carp of	1,49)	[] Sand	
Depth of Sample	ee below	[] Shovel [] Hand Spoon			[] Organic [] Gravel	
		[] Aluminum Par [] SS Bucket				
Field GC Data: [] Field [Duplicate	Juplicate Collected ID	14 SS b	sul (dee	p only)		
		Type Of Sample (. ,	Sample Location S	ketch:
		Discrete Composite			Yes	210
ソ =	l A, bgo	• • •			MNO See	meep
_	1, 39	Sample Observati	ons:			•
		Color		-		
		[]		•		
SAMPLES COLLECTED					_	
Analysis		ction Volume ode Require				le Bottle umbers
1 voc		SV (2) 20Z A				_//
[X SVOC [X Pest/PCB		SS (1) 16 OZ .	AG	[+'		-/
l ` `.	LH10			j	i/_	
[PAL Inorganics		SS		[• [1/ 1/	
[V TPHC	·	ss		j.	ř	-//
[] Lead Only [] TOC		ss 🔻		l ;]/],/	
TITCLP TO EPULLIDA	1311	SS (1) 16 O7	4 DEG	cyneoti iv	ř/	_//
PAL Inorganics: ICP Metals	s (JS16; AS (JD19); SE (JD15)	; TL (JD24); SB (JD25); P	B (JD17); HG (JB1	10).		
NOTES/SKETCH			*			
			,			
		I	repth	~1		
Sam	pHD Tiv	, j	7. 63)	06	5.	
200.11	1		O_		051 A.	0.27.000
5F5	71400 i1¢		0-0.5	(())	black	orginal same
SF57	יכוי	D	1-153	$\mathcal{L}_{\mathcal{L}}}}}}}}}}$	on to	p 60-06 A
J+ 5 1	1 101		(4.5)	Z	wet c	h-grey san
E E					•	28.14%
- V) C	COAT 101 M	on sinfr	ico do	onse r	ant law	ex
	peat layer	.A.	ice W	CV10- 1	ing	
	ar 10 0 09	70-				ŀ
IN DIN	not work	ing - off	-site s	Samol	es thos	en
7 10	· / / / / / / / / / / / / / / / / / / /	1 - 5	٠	1	>	
(ry sight, or	soi, 4 h	stonce	at into	> .	
JW-11	e sample c 1-15 A bgs), in Ms/MSD	ocleaned a	t Sx57	1401		[
V17.319	1 3e n	ocluding -			FIGURE	E 4-7
	the bys),	S	URFACE SC	DIL SAMPL	E DATA REC	URD
A - ·	a1-W2/W2D		PR	OJECT OF	FERATIONS P	LAN 💮
- UST 10	ab#= HLA	DVIS来12	FURIL	JEVENS, N	IASSACHUSE nmental Service	:115
						o,o.

SURFACE SOIL SAMP	LE FIELD DATA RECORD
Project: Devens	site: AUC 37 Area 3
Project Number: 09174.08	Date: 5/20/98
Site Identification: 575-98-15X	- Name Tak
Time: Start: 1140 End: 1150	Signature of Sampler: Nancy E. Rota
Field Sample No. See Selow M. Hand A. [] S.S. Sp. Sp. September 1. Showell B. M. Hand S. [] Showell B. M. Hand S. [] Alumin S. M. Hand S. [] Alumin S. M. Hand S. [] Alumin S. M. Hand S. [] Alumin S. M. Hand S. [] Alumin S. M. Hand S. [] Alumin S. M. Hand S. [] Alumin S. M. Hand S. M. Han	Spoon [] Gravel um Pans
Field GC Data: [] Field Duplicate Collected [] SS But	5 Lowi (deep only)
Type Of Sample Other	ample Collected: Sample Location Sketch: [] Yes site [M No SCL MAP oservations:
SAMPLES COLLECTED Method Fraction	Volume Preservation Sample Sample Bottle
	Required Method Collected ID Numbers
• • •	2OZ AG 4 DEG C
[Pest/PCB LH16 SS	1002 AG
LH10 [YPAL Inorganics See Below SS	
[] Explosives LW12 SS	
TPHC 418.1 SS 1 Lead Only JD17 SS	
[] Lead Only JD17 SS [] TOC 415.1 SS	
[TCLP SS 1311 SS	4 DEG C/MeOH iv
PAL Inorganics: ICP Metals (JS16; AS (JD19); SE (JD15); TL (JD24); SB (J	D25); PB (JD17); HG (JB10).
NOTES/SKETCH	
Samp 1D Time (SF571500 1145	bepth (the bape) 6-0.5 black org. sandy sitt dense free root layer at a corange from poorly gr. Sand-wet
* PID not working - D by sight, odor, + h Off-site sample collecte (3-3,5ft lgs). QST lab # = HLADVIS*13	off-site Samples chosen istorical in to. id at 5x57150 FIGURE 47 SURFACE SOIL SAMPLE DATA RECORD PROJECT OPERATIONS PLAN FORT DEVENS, MASSACHUSETTS

	SURFA	CE SOIL SAMPL	E FIELD DATA RI	ECORD	
Project: De	vens		Site:	C 57 Am	2a 3
Project Number:		,08	Date: 5 2	8910	
Site Identification:			•	Name	y F. Rotea
Time: Start:	155 End:	1205	Signature of Samp	oler: Manc	y L. Maria
SOIL SAMPLE Field Sample No.	see below	[i/Hand Aug [] S.S. Split	sed For Collection: ler (dlef On) Spoon	Soil Typ [] Clay [] Sand	
Depth of Sample Field GC Data: [] Field [•	[] Shovel [] Hand Spo [] Aluminum [] SS Bucke	Pans	[] Orga [] Grav	
Duplicate L. 5	A bgs	Typé Of Sam [V] Discrete [] Composit Sample Obse [] Odor [] Color []	9	l lVes	ocation Sketch: SC2 May
SAMPLES COLLECTED	A fash and	Creation Val	Bassassian	Cample	Samala Balla
Analysis	Method Number		ume Preservation uired Method	Sample Collected	Sample Bottle ID Numbers
[] VOC	LM19	SV (2) 20	Z AG 4 DEG C	[] _	
[] SVOC [] Pest/PCB	LM18 LH16	SS (1) 16 SS	OZ AG	[] -	
[] resurch	LH10	33		[] -	
[] PAL Inorganics	See Below	SS		<u> </u>	
[] Explosives [] TPHC	LW12 418.1	SS SS		[] -	
[] Lead Only	JD17	SS (
[] TOC	415.1	SS	4.050.0	[] -	
[] TCLP	1311	SS (1) 16	4 DEG C OZ AG	() _	
PAL Inorganics: ICP Metals NOTES/SKETCH	s (JS16; AS (JD19); SE	(JD15); TL (JD24); SB (JD25	5); P8 (JD17); HG (JB10).		
NOTES/SKETCH					
_		,	Depth,	~ 1	
sam	PID	Time ((the base)	065	
4	•			1.	
	571600	1200	0-Q5	-black or	g, sandy silly sand at su
SF	571602	1205	2-2.5	(ensional	P Sand at Sur
	- 0	,		THE 120F	layer at 0.5 f
				orange mo Sand-	graded
				Sana-	<i>1</i> 1000
W Tik	21 1-5 A	. 1	- a 68 == 1	A-min 1 -	
* LM N	ot work	eura-cho	se of site	, sumple	
1	ned an	sidet on	se off-site lor, + his	toncal 11	nto.
11()	IN MANIE		J. 1 4 600 C		
50,		()	_		
N		Mas sign	ected		i
No off	-site sav	riple coll	ected Surface soil	F	IGURE 4-7

FORT DEVENS, MASSACHUSETTS
——ABB Environmental Services, Inc.-

SURFA	CE WATER	AND SEI	DIMENT SAM	PLE FIELD I	DATA REC	ORD
Project: Devens			Site:	AOC	57	
Project Number: 0	9144.08)	Date	5/20/9	78	
Site Identification:	58K-9	8-01X				
Time: Start: 0835	End:		5 Siar	nature of Sample	er:	
SURFACE WATER INFORMATIO		^	Type of Surface \	Water: [] River	Equipment Used F	
Field Sample No. 38K980 X Wat	er Depth N	<u>q</u> (tt)	[] Pond/Lake	Seep /	Bomb Sample	
Depth of Sample		_	• •		[] Pump	
From Top of Water NA (ft)	Temperature _ <u>N</u>	<u>Fi</u> Deg. C.	Sample Location	Sketch: [Ves		
Spec. Cond. NA µMHOS/CI	AL HOLL	1 Inits		/ 11.00		•
Spec. Cond. For printed of	W (P)		_/			
Field GC Data: [] Field Duplicate Colle	ected		Velocity Measure	ments Obtained? v Measurement Data F	Record	
Duplicate ID			[] res, see riov	V Measurement Data?	180010	
SEDIMENT INFORMATION	`		for Collection:	Sedimen	• •	
Field Sample No.		[] Gravity Core		[]Clay []Sand		
Depth of Sediment Sample	(#)	[] Dredge		[] Orga	nic	
nabiti or pegittiarir partibia	(11)	[] Hand Spook		[] Grav	ei	
Field Gc Data: [] Field Duplicate Colle		[] Aluminum P [] SS Bucket	perio			
Duplicate Id		ii <u></u>				
		Type Of Sample	Collected:	Sample (Observations:	
	/	[] Discrete		[]Odor		
		[] Composite		. [] Color		
						
SAMPLES COLLECTED	Method	Faction	Preservation	Volume	Sample	Sample Bottle
Analysis	Number	Code	Method	Required	Collected	ID Numbers
M svoc	UM20 UM18	VP MS	HCL, 4 DEG C 4 DEG C	(4) 40 ML (2) 1 L AG	[]	
Pest/PCB	UH02	EC	4 DEG C	(2) 1 L AG	ii	
PAL Inorganics (Specified Below)	UH13	N	HNO3 TO pH<2	1 L P-CUBE	[]	
[] Lead Only	* SD20	N	HNO3 TO pH<2		[]	
[] Explosives	UW19 UW32	LC.	4 DEG C	(3) 1 I. AG	[]	
[] TPHC	418.1	0	H2SO4 TO pH<2	1 L AG	[]	
[] TOC	415.1 TF22	O S	H2SO4 TO pH<2 H2SO4 TO pH<2	1 L P-CUBE 1 L P-CUBE	[]	
[] Anions	TT10	C	4 DEG C	1 L P-CUBE	ίi	
() TOO Only	310.1 160.2	N C	HNO3 TO pH<2 4 DEG C	1 L P-CUBE 1 L P-CUBE	[]	
[] TSS Only [] H2O Quality (Specified Below)	100.2	s	H2SO4 TO pH<2	1 L P-CUBE	į į	
, . , . ,		C N	4 DEG C HNO3 TO pH<2	1 L P-CUBE 1 L P-CUBE	[]	
[] Coliform	303,909	IA	4 DEG C	(1) 4 OZ	ίi	
VIEPH/UPH			HC1/H250,	1/4 Sterile	7	
-	Method	Fraction	Preservation	Volume	Sample	Sample Bottle
Analysis	Number	Code	Method	Required	Collected	ID Numbers
[] voc	LM19 LM18	sv ss	4 DEG C	(2) 2OZ AG (1) 16 OZ AG	[]	
[] SVOC [] Pest/PCB	LH16	SS		(., 52 /	ij	
• •	LH10	SS			[]	
[] PAL Inorganics [] Explosives	See Below LW12	ss			ii	
() TPHC	418.1 ID17	SS SS				
[] Lead Only [] TOC	JD17 415.1	SS		*		
[] TCLP	1311	SS	4 DEG C	(1) 16 ÖZ AG	[]	
NOTES					·	
PAL Inorganics: ICP metals (SS10); AS H2O Quality: PO4 (TF27); TKN (TF26);	S (SS22); SE (SD21 NIT (TF22); CL/S04); TL (SD09); SB 4 (TT10); TSS (16	(SD20); HG (SB01). 50.2); ALK (301.0); Hardi	ness.		
All parameters collected as totals, let no	on riitered					
PAL Inorganics: ICP metals (JS16; AS	(JD19); SE (JD15);	TL (JD24); SB (J	025); PB (JD17); HG (JE	310).	a flor	
Rinseate blank	to repr	esent	dicon pro	cours t	A TYCI	EIGHDE 4 10
Lediment Sax	mpling		ou mice	1		FIGURE 4-10
(MD)	SURFACE					TA RECORD
Faurement : soi	lauger.	SS bowl	n Hzo	PROJEC		TIONS PLAN
m & Hio Source! Hi	o point	- deco	n Hzo	FORT DEVE		ACHUSETTS
my P MW SOUTCE . TI	100(1)		11 112	ABB !	Environment	tal Services, Inc.

FIELD DATA RECORD - GROUNDWATER SAMPLING	
PROJECT USAEC / Devens AOC 57 FIELD SAMPLE NUMBER MX5702 XX STUDY AREA / AOC AC	c57
= 20 GU 02 V	6-78
1230 (20)	
WEATHER COURS.	57/605
WATER LEVEL / WELL DATA PROTECTIVE (7°-) PROTECTIVE PROTECTIVE	
MEASURED WELL DEPTH 4.35 FT (TOR) HISTORICAL WELL DEPTH 4.35 FT (TOR) (FROM GROUND) 2.05 FT CASING / WELL DEPTH DIFFERENCE NA	FT
DEPTH TO WATER 3.2 FT (TOR) SCREEN 2 FT DIAMETER / IN MATERIAL Procession	10
HEIGHT OF WATER COLUMN / . / S FT x GAL/FT (INCH WELL) = GAL/VOL WELL YES INTEGRITY: CAP V CASING	NO N/A
PID PID CASING COLLAR AMBIENT AIR BKC PPM WELL MOUTH BKC PPM TOTAL VOLUME PURGED GAL LOCKED	
PURGE DATA	
PURGE VOLUME (gallons) 0.25 0.75 /,5 SAMPLE OBSERVATIONS:	
PURGE RATE (gpm) CLEAR	
TEMPERATURE (degreesC) /6.3 /4.2 /4.1	<u>ٻ</u>
pH (units) 5.5 (4.1 (4.1 CLOUDY	
TURBIDITY (ntu) - 10.0, 5.3 + 3.2 + 2.8 + 1 TURBID	
SPEC. COND. (uhmos/cm) 0.135 0.95 0.90 U ODOR SWAMP	ب .
TURBIDITY (ntu) 999 438 330 OTHER (see notes)	
REDOX POTENTIAL (+/- mv)	
EQUIPMENT DOCUMENTATION	
PURGING SAMPLING DECON FLUIDS USED PERISTALTIC PUMP METHANOL ELECTRIC COND. PROBE SUBMERSIBLE PUMP LIQUINOX FLOAT ACTIVATED BLADDER PUMP POTABLE WATER KECK INTERFACE PROBE PVC/SILICON TUBING STEAM CLEANING BAILER NITRIC ACID NUMBER OF FILTERS USED	
ANALYTICAL PARAMETERS EPA OPA METHOD FRACTION PRESERVATION VOLUME SAMPLE SAMPLE BE NUMBER CODE METHOD REQUIRED COLLECTED ID NUMBER VOC VMS3-WA HCL / 4 DEG. C 3 X 40 ML VMS1-WA HCL / 4 DEG. C 3 X 40 ML VMS1-WA HCL / 4 DEG. C 3 X 40 ML	
☑PEST / PCBs PST1-WA 4 DEG. C 2 X 1 L AG ☑ /	
HERBICIDES HB61-WA 4 DEG. C 2 X 1 L AG MR61-WA 4 DEG. C 2 X 1 L AG MR61-WA HN03 to pH <2 1 x 1 L P MR61-WA 1 J	
SULFATE NITRATE/NITRITE USEPA 300 4 DEG. C 1 X 50 ML P	
☐ SULFIDE USEPA 376.1 NAOH to pH >9 1 X 500 ML P /	
FERROUS IRON FIELD METHOD	
☐ TOTAL PHOSPHORUS USEPA-365.4 H2SO4 to pH <2 1 X 50 ML P	
TOC USEPA-415.1 H2SO4 to pH <2 1 X 500 ML AG	
☐ TSS ONLY USEPA-160.2 4 DEG. C 1 X 1 L P ☐// [METHANE / CARBON DIOXIDE	
NOTES (1) PAL INORGANICS: ICP METALS (ICP1-WA AND ICP2-WA), HG (HGC1-WA)	
WELL PURCES DRY AT I WELL VOLUME CAS WELL AS	_
RECUSEUE AT a 1/LITRE / 20 /CC	- 9da
SIGNATURE: 1 STATE OF CONTRE AND SLOW	.υ <u>ξ</u>
TO SAME WELL VOLUME TAND SELE	-

FIELD DATA RECORD - GROUNDWA	ATER SAMPLING	
PROJECT USAEC / Devens AQC 57	FIELD SAMPLE NUMBER MX5703XX	STUDY AREA / AOC AOC 57
SITE ID 577-98-03X	SITE TYPE WELL	DATE 5.26.78
ACTIVITY START 1745 END 1845	JOB NUMBER 9/44-08	FILE TYPE CGW
The first fi	J GOS NOMBEN THE !	WEATHER CLEAR 70°
WATER LEVEL / WELL DATA MEASURED WELL DEPTH G. 8 FT (TOR) HISTORICA WELL DEPTH TO WATER 2.45 FT (TOR) SCREEN LENGTH HEIGHT OF WATER COLUMN H.4 FT x GAL/FT PID AMBIENT AIR BKG PPM WELL MOL	TH GROUND) 2.5 FT WELL DIAMETER IN GALVOL	PROTECTIVE CASING / WELL
PURGE DATA		
	34 52	SAMPLE OBSERVATIONS:
	250 m/m	CLEAR
	14.2 14.1	COLORED
	6.6 6.4	CLOUDY
TURBIDITY (atu) D.O. 1.754	6.14 5.9	TURBID CLEARING
	.096 0.09	ODOR
TURBIDITY (ntu) 999	4 4	OTHER (see notes)
REDOX POTENTIAL (+/- mv)		
EQUIPMENT DOCUMENTATION		
PURGING SAMPLING PERISTALTIC PUMP SUBMERSIBLE PUMP BLADDER PUMP PVC/SILICON TUBING TEFLON/SILICON TUBING BAILER IN LINE FILTER	METHANOL LIQUINOX POTABLE WATER DEIONIZED WATER STEAM CLEANING NITRIC ACID	LEQUIPMENT USED RIC COND. PROBE ACTIVATED NTERFACE PROBE
VOC	S3-WA S1-WA HCL / 4 DEG. C 3 X 40 ML V1-WA 4 DEG. C 2 X 1 L AG V3-WA 4 DEG. C 2 X 1 L AG T1-WA 4 DEG. C 2 X 1 L AG T1-WA 4 DEG. C 2 X 1 L AG 61-WA 4 DEG. C 2 X 1 L AG 61-WA 4 DEG. C 2 X 1 L AG 71-WA 7 DEG. C 7	SAMPLE SAMPLE BOTTLE COLLECTED ID NUMBERS
NOTES (1) PAL INORGANICS: ICP METALS (ICP1-WA AND I	CP2-WA), HG (HGC1-WA) LOW FLOW SAMPLE	COLLECTION FOR ALL STAPES
SIGNATURE:		
RECEIVED BY:		

5/15/98

FIELD DATA RECORD	GROUNE	WATER S	SAMPLING			
PROJECT USAEC / Devens AOC 57		FIE	ELD SAMPLE NU	MBER MX5	XXYOF	STUDY AREA / AOC AOC 54
SITE ID 577-98-04X			SITE	TYPE WELL		DATE 5-27-9
ACTIVITY START 0735	END OG 1	00	JOB NUI	MBER 01144	-లశ	FILE TYPE CGW
		<u></u>				WEATHER CLEAR GS"
WATER LEVEL / WELL DATA				DOOTE OT U.S.		DOOT OT US
MEASURED 7.5 FT (T	OR) HISTOI	RICAL 7	.5 FT (TOR)	PROTECTIVE CASING STICE (FROM GROU		PROTECTIVE CASING / WELL DIFFERENCE DIF
DEPTH TO Z.95 FT (T	SCREE OR) LENGT		FT	WELL DIAMETER	IN	WELL PV-C
HEIGHT OF WATER COLUMN 4.55	FT xGA	AL/FT (INCH	HWELL) =	G/	ALVOL	WELL YES NO N/A INTEGRITY: CAP
PID AMBIENT AIR BICC F	PID PPM WELL	моитн Т	34CC PPM	TOTAL VOLUM	ME PURGED	CASING
PURGE DATA						
PURGE VOLUME (gallons)	2 L	66	8L			SAMPLE OBSERVATIONS:
PURGE RATE (gpm)	50milm	500 ml min	500 my min			CLEAR
TEMPERATURE (degreesC)	12.0	11.0	10.9			- COLORED
pH (units)	6.0	6.10	6.12			CLOUDY
TURBIDITY (ntu)	999	25	16			TURBID CLEARING
SPEC. COND. (uhmos/cm)	0131	0.092	0.066			ODOR SWAMPY
REDOX POTENTIAL (+/- mv)	1,6	2.5	3,5			OTHER (see notes)
EQUIPMENT DOCUMENTATION			· · · · · · · · · · · · · · · · · · ·	***************************************		
BLADDER PVC/SILIC	IBLE PUMP PUMP ON TUBING ILICON TUBING	ME LIC	LUIDS USED ETHANOL QUINOX DTABLE WATER EIONIZED WATER EAM CLEANING TRIC ACID	-	ELECT FLOAT KECK	L EQUIPMENT USED RIC COND. PROBE ACTIVATED INTERFACE PROBE
ANALYTICAL PARAMETERS EPH-VPH VOC VOC VOC SVOC SVOC PEST / PCBs HERBICIDES PAL INORGANICS SULFATE NITRATE/NITRITE SULFIDE IRON ONLY FERROUS IRON TOTAL PHOSPHORUS AMMONIA NIROGEN TOC TSS ONLY METHANE / CARBON DIOXID NOTES (1) PAL INORGANICS: ICP METAL		METHOD NUMBER VMS3-WA VMS1-WA SMV1-WA SMV3-WA PST1-WA HB61-WA (see notes) USEPA 300 USEPA 376.1 ICP1-WA FIELD METHO USEPA-365.4 USEPA-160.2	CODE	PRESERVATION METHOD HCL / 4 DEG. 4 DEG. C 4 DEG. C 4 DEG. C HNO3 to pH < 4 DEG. C NAOH to pH > H2SO4 to pH < 4 DEG. C	REQUIRED C 3 X 40 ML C 3 X 40 ML 2 X 1 L AG 2 X 1 L AG 2 X 1 L AG 2 X 1 L AG 2 X 1 L AG 2 X 1 L P 1 X 50 ML P 1 X 500 ML P 2 1 X 1 L P-Cube <2 1 X 50 ML P <3 X 400 ML P 1 X 400 ML P	SAMPLE SAMPLE BOTTLE COLLECTED ID NUMBERS
SIGNATURE: RECEIVED BY:						
1						

GWFORM15.XLS/GENERIC 5/15/98

FIELD DATA RECORD	GROUNDWA	TER SAMPLING	3			
PROJECT USAEC / Devens AOC 57		FIELD SAMPLE N	JMBER MX.57	2//XX	STUDY AREA / AG	oc 404 57
SITE ID 57M -96 - 11×		SITE	TYPE WELL		DA	TE 05.27.78
ACTIVITY START 0835	END 0900	JOB N	UMBER 09144 -	63	FILE TY	PE CGW
			•		WEATH	ER CLEAR 650
WATER LEVEL / WELL DATA						
MEASURED 15.10 FT (T	HISTORICAL (OR) WELL DEPTH	15.10 FT (TOR)	PROTECTIVE CASING STICKUI (FROM GROUND	2,30 FT	PROTECTIVE CASING / WELL DIFFERENCE	0,60 FT
DEPTH TO 4,05 FT (T	SCREEN LENGTH	(O FT	WELL DIAMETER	IN	WELL MATERIAL	Prc .
HEIGHT OF WATER COLUMN // .95	FT xGAL/FT(INCH WELL) =	GALA	VOL	WELL INTEGRITY: CAP CASING	YES NO N/A
PID AMBIENT AIR BLG F	PID WELL MOUTH	BKE PPM	TOTAL VOLUME I	PURGED	GAL LOCKED	
PURGE DATA						
PURGE VOLUME (gallons)	46	21 186			SAMPLE OBS	ERVATIONS:
PURGE RATE (gpm)	24/min 24	/mia 2 1/mia			CLEAR	
TEMPERATURE (degreesC)	9.3"	9.8			COLOR	ED Lt. orange /cla
pH (units)		.23 6.21				Y
TURBIDITY (ntu)	 	4 9				
SPEC. COND. (uhmos/cm)	0.157 0.1				⊣	SWAMPY
REDOX POTENTIAL (+/- mv)	1.13	84 1.10			OTHER	(see notes)
SUBMERS BLADDER PVC/SILIO	TIC PUMP SIBLE PUMP PUMP CON TUBING SILICON TUBING	METHANOL LIQUINOX POTABLE WATER DEIONIZED WATE STEAM CLEANING	ER .	ELECTF FLOAT KECK IN	EQUIPMENT USED RIC COND. PROBE ACTIVATED VITERFACE PROBE	
ANALYTICAL PARAMETERS FF H V PH VOC VOC SVOC SVOC PEST / PCBs HERBICIDES HERBICIDES SULFATE NITRATE/NITRITE SULFIDE IRON ONLY FERROUS IRON TOTAL PHOSPHORUS AMMONIA NIROGEN TOC TSS ONLY METHANE / CARBON DIOXID	USEP ICP1-1 FIELD USEP USEP USEP USEP	BER CODE -WA -WA -WA -WA -WA WA Otes) A 300 A 376.1	PRESERVATION METHOD HCL / 4 DEG. C HCL / 4 DEG. C 4 DEG. C 4 DEG. C 4 DEG. C 4 DEG. C HNO3 to pH <2 4 DEG. C NAOH to pH >9 HNO3 to pH <2	3 X 40 ML 3 X 40 ML 2 X 1 L AG 2 X 1 L AG 2 X 1 L AG 2 X 1 L AG 1 X 1 L P 1 X 50 ML P 1 X 500 ML P 1 X 1 L P-Cube 	SAMPLE COLLECTED	SAMPLE BOTTLE ID NUMBERS /
NOTES (1) PAL INORGANICS: ICP METAL	.S (ICP1-WA AND ICP	2-WA) , HG (HGC1-W	A) Dureic	are MS:	5711XX C	ociec 727
			NISIM	ss cour	CTUS	
						-
SIGNATURE:						
RECEIVED BY:						

GWFORM15.XLS/GENERIC 5/15/98

	IER AND SE	DIMIENT SAN	IIAND BIRND		
Project: <u>Devens</u>		Site			<u> १</u>
Project Number: 091년나.(Date	s:5 <i>7</i>	21/98	
	1x/57D-98		•	. 1/	TO D
Time: Start: <u>のそ3の</u> E	nd: <u>0850</u>	Sig	nature of Sample	er: <u> </u>	may E. Rotes
SURFACE WATER INFORMATION		Type of Surface	Water:	Equipment Used	for Collection:
Field Sample No. WK570:60 Water Depth		[] Stream [] Pond/Lake	N Seep	Nene Grab	Into Bottle
·	e //. 2 Deg. C.	Sample Locatio	n Sketch: [] Yes	W 35 0%	tubing/inline fit
Spec. Cond. ## µMHOS/CM PpH 5		iura 949+	- 11:00 Se	e mapt	from Shallow
Field GC Data: [] Field Duplicate Collected Duplicate ID		Velocity Measur	_ rgg/ _ ements Obtained? www.Measurement Data R	Record	
SEDIMENT INFORMATION	Equipment Used	For Collection:	Sodimon	Tuna	
Field Sample No DX570100	[] Gravity Core		Sediment		
7100 00110101	[] S.S. Split Sp	oon	[V Sand		
Depth of Sediment Sample 0-4 rby	[] Dredge [•/ Hand Spoon		[v]Orgai []Grave		
Field Gc Data: [] Field Duplicate Collected	[] Aluminum Pa		is si		
Duplicate Id	[] SS Bucket	യി	(-) S1	• (
	Type/Of Sample		Sample C	Observations:	
	Discrete	Collected.	•	Josefvations.	
	[] Composite		Color		
			[]		
SAMPLES COLLECTED Method	Faction	Preservation	Volume	Sample	Sample Bottle
Analysis Number	Code	Method	Required	Collected	ID Numbers
IN VOC UM20	VP	HCL, 4 DEG C	(4) 40 ML	V	
	MS EC	4 DEG C 4 DEG C	(2) 1 L AG (2) 1 L AG	الم	// -
P PesVPCB UH02 UH13		+ DEG C	(Z) 1 L AG	174	
(V) PAL Inorganics (Specified Below)	N/NF	HNO3 TO pH<2	1 L P-CUBE	[با	
[] Lead Only SD20 [] Explosives UW19	N LC	HNO3 TO pH<2 4 DEG C	(3) 1 l. AG	[]	// /
[] Explosives OW19 UW32		+ DEG C	(3) 1 1, AG	t 1	
[1] TPHC 418.1	0	H2SO4 TO pH<2	1 L AG	[]	
[] TOC 415.1 [] Anions TF22	O S	H2SO4 TO pH<2 H2SO4 TO pH<2	1 L P-CUBE 1 L P-CUBE	[]	// /
TT10	c	4 DEG C	1 L P-CUBE		
310.1	N	HNO3 TO pH<2	1 L P-CUBE	11/	
✓ TSS Only 160.2	C S	4 DEG C	1 L P-CUBE		
[] H2O Quality (Specified Below)	C	H2SO4 TO pH<2 4 DEG C	1 L P-CUBE 1 L P-CUBE	[]	
	N	HNO3 TO pH<2	1 L P-CUBE	[]	
[] Coliform 303,909	•	4 DEG C りでしない。それっし	(1) 4 OZ		//
LYS EPHNPH	Ŕ	HCI/HZSO _{I/} IPH) (BPH	Stenle e	[Q	
Method	Fraction	Preservation	Volume	Sample	Sample Bottle ID Numbers
Analysis Number	Code	Method	Required	Collected	Numbers
[√] VOC LM19 [√] SVOC LM18	sv ss	4 DEG C	(2) 2OZ AG (1) 16 OZ AG	4	//
[V] SVOC LM18 [V] PesvPCB LH16	· SS		(1) 10 O2 AG	الما	
LH10				<u>[]</u>	!!
[✓] PAL Inorganics See Below [] Explosives LW12	SS SS			[/] []	'/'/
TPHC 418.1	SS			lu d	
[] Lead Only JD17	SS		↓	!]	///
[/] TOC 415.1 [] TCLP 1311	SS SS	4 DEG C	(1) 16 OZ AG	M 11-	'/'/
RV BAINEH		4 DEG C 4 C/ Mesi	1 (7,002,70	<u> الجينة</u>	
NOTES PAL Inorganics: ICP metals (SS10): AS (SS22): SE (SD21): TL (SD09): SR /5	SD20): HG (SR01)			
PAL Inorganics: ICP metals (SS10); AS (SS22); SE (H2O Quality: PO4 (TF27); TKN (TF26); NIT (TF22); C	US04 (TT10); TSS (160	.2); ALK (301.0); Hardi	ness.		
All parameters collected as totals, le: non Filtered					
PAL Inorganics: ICP metals (JS16; AS (JD19); SE (JE	715); TL (JU24); SB (JD2	(5); PB (JD17); HG (JB	110).		
+pigigiob of					FIGURE 4-10
SO/MUKU SURFA	CE WATER A	ND SEDIME	NT SAMPLE	FIELD DA	TA RECORD
il o antin		3			TIONS PLAN
th20 700 (1)					ACHUSETTS
filtered sample	,				
			ADD E	naitouwey.	tal Services, Inc.——

SURFACE WATE	R AND SEDIMEN	T SAMPLE FIEL	D DATA REC	CORD	
Project: Devens		Site: AO	c 57 Are	20 2	
Project Number: 09144.	08		121198		
	1570-98-02X		 		
Time: Start: See below End		Signature of San	npler: <u>Mam</u>	Cy E Roka	
SURFACE WATER INFORMATION	Тур	of Surface Water:	Equipment Used	7	
Field Sample No. WX 576260Water Depth		itream [] River	Mone, Grab in		
Depth of Sample	EV)	Malsh	Pump/Six	Pyctubing/inline	file
From Top of Water (ft) Temperature		ple Location Sketch: [] Yes 999+ntus IV No	•	J	
spec. Cond. <u>150</u> µмноs/см ≉ рн <u>6 ⊬ С</u>		G.14 mg/L		•	
Field GC Data: [] Field Duplicate Collected Duplicate ID	Velo	city Measurements Obtained? es, See Flow Measurement Da	nta Becord		
SEDIMENT INFORMATION		es, see Flow Measurement Da	sia necora		
	Equipment Used For Collect [] Gravity Corer		ment Type:		
Field Sample No. DX570200	[] S.S. Split Spoon	[]C []S	Sand	tussock sedan	1
Depth of Sediment Sample(ft)	[] Dredge [] Hand Spoon	(M)	Organic CHICK Gravel	COLLEGE COLLEGE	ears. E
Field Gc Data: [] Field Duplicate Collected	[] Aluminum Pans		sravei – Silt	OVER EN	Trous.
Duplicate Id	[] SS Bucket M SS bowl	¥¥J.	○ 1 € 1	-13-1 39	
+ sed is ~ 1' under			ala Ohaanistiaaa		
regetation + H20	Type Of Sample Collected: [] Discrete		ple Observations: Odor		
Actation & in	[] Composite		Color		
	·····	L 1.			
SAMPLES COLLECTED Method	Faction Present		Sample	Sample Bottle	
Analysis Number	Code Meth		Collected	ID Numbers	
VOC UM20 SVOC UM18	VP HCL, 4 (MS 4 DE	` ·	(X)		
Pest/PCB UH02 UH13	EC 4 DE		ાં મેં		
[1] PAL Inorganics (Specified Below)	N/NF HNO3 TO		M		
[] Lead Only SD20 [] Explosives UW19	N HNO3 TO		[]		
UW32 [] TPHC 418.1	O H2SO4 T) pH<2 1 L AG			
[] TOC 415.1	O H2SO4 T	pH<2 1 L P-CUBE	ĹĴ		
[] Anions TF22 TT10	S H2SO4 T		[]		
310.1	N HNO3 TO		ii		
[✔] TSS Only 160.2 [] H2O Quality (Specified Below)	C 4 DE0 S H2SO4 T0		M		
() · · · · · · · · · · · · · · · · · ·	C 4 DE	C 1 L P-CUBE	[]		
[] Coliform 303,909	N HNO3 TO 4 DEC				
EJ EHIVM	HCI/H2SO, NPW (EPA)	The Stenie	1		
Method Apphair	Fraction Present		Sample	Sample Bottle	
Analysis Number	Code Meth		Collected	ID Numbers	
[V] VOC LM19 [V] SVOC LM18	SV 4 DEG SS	(2) 2OZ AG (1) 16 OZ AG	14		
Pest/PCB LH16	SS	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	[1]		
LH10 PAL Inorganics See Below	SS				
[] Explosives LW12	SS				
[√] TPHC 418.1 []_Lead Only JD17	SS SS	1	4		
✓ TOC 415.1	SS	, , , , , , , , , , , , , , , , , , ,	i de		
TO TOP 1311	SS 4 DE	10 (1) 16 OZ AG	63/		
NOTES PAL Inorganics: ICP metals (SS10); AS (SS22); SE (SD2:): TL (SD09): SB (SD20): ₩Ω	(SB01).			
H2O Quality: PO4 (TF27); TKN (TF26); NIT (TF22); CUS0 All parameters collected as totals, ie: non Filtered	4 (TT10); TSS (160.2); ALK (3	01.0); Hardness.			
PAL Inorganics: ICP metals (JS16; AS (JD19); SE (JD15);	TL (JD24); SB (JD25); PB (JD	17); HG (JB10).			
*actual start time = 0	935				
actual end time = 10) 55 			FIGURE 4-10	
actual end tirus = 10 SURFACE	E WATER AND S	EDIMENT SAMPL	E FIELD DA	TA RECORD	
		PROJI	ECI OPERA	HONS PLAN	
				ACHUSETTS	
		ABE	5 Environment	al Services, Inc.——	l

9505005S L 3

SURFA	ACE WATE	ER AND SI	EDIMENT SAM	IPLE FIELD	DATA RE	CORD	
Project: Devens			Site	: Aocs	57 Area	2	
	7144.08		Dat		100		
Site Identification: 570	u-98-03x		-03x		, ,	5 -	DAL
Time: Start: <u>See no</u>	<u> </u>	i: <u>(193</u> 0	Sig	nature of Samp	ler:	Yancy t	
SURFACE WATER INFORMATI	ON		Type of Surface	Water	Equipment t lea	ed For Collection:	
Field Sample No. WX570360w	ater Depth	<i>(1)</i>	[] Stream [] Pond/Lake	[]River	[V] None, Grat	Into Bottle	,
Depth of Sample From Top of Water(f	t) Temperature	5.0 _{Deg. C.}	E/J Marsh Sample Locatio	n Sketch: []_Yes	1	+ PVC tubing/in	line filter
Spec. Cond. 44	см ≠рН €. 9	> i Units	Turb. 999+	ntus (10 No 36	ee majo.	because to	os shallou
Field GC Data: [] Field Duplicate Co Duplicate ID	lected		Velocity Measur	V)G/L ements Obtained? ow Measurement Data	Record	— — — — — — — — — — — — — — — — — — —	s Stituretted
SEDIMENT INFORMATION		Sautament I to					
Field Sample No. DX5703 & Depth of Sediment Sample	, <u>5</u> (n)	[] Gravity Co [] S.S. Split [] Dredge [√] Hand Spo [] Aluminum [] SS Bucke	Spoon on Pans	Sedimer []Clay [V/Sank [V/Orga []Grav	d (Some) anic rel		
Duplicate Id	(MP)	is <u>55</u>	pomi				
So io carled ~ ±		Type Of Samp	ole Collected:	Sample	Observations:		
foot under o		Discrete Composite	•	[] Odo: [17 Colo		<u></u>	
tussock & mo	ursh ma	f 1 00pos	•	[]	·		
SAMPLES COLLECTED							
Analysis	Method Number	Faction Code	Preservation Method	Volume Required	Sample Collected	Sample Bottle ID Numbers	
[voc	UM20	VP	HCL, 4 DEG C	(4) 40 ML	11		
SVOC V PesvPCB	UM18 UH02	MS EC	4 DEG C 4 DEG C	(2) 1 L AG	ix		
	UH13			(2) 1 L AG	l UP		
[V] PAL Inorganics (Specified Below) [] Lead Only	SD20	N/NE	HNO3 TO pH<2 HNO3 TO pH<2	1 L P-CUBE	[]		_ 📥
[] Explosives	UW19	LC	4 DEG C	(3) 1 I. AG	ii		
[] TPHC	UW32 418.1	0	H2SO4 TO pH<2	1 L AG	[]		
į j TOC	415.1	0	H2SO4 TO pH<2	1 L P-CUBE	ĹĴ		
[] Anions	TF22 TT10	s C	H2SO4 TO pH<2 4 DEG C	1 L P-CUBE 1 L P-CUBE	[]		
	310.1	N	HNO3 TO pH<2	1 L P-CUBE	ii,		
[1] TSS Only	160.2	C S	4 DEG C H2SO4 TO pH<2	1 L P-CUBE	كبروا		
[] H2O Quality (Specified Below)		C	4 DEG C	1 L P-CUBE 1 L P-CUBE	[]		
		N	HNO3 TO pH<2	1 L P-CUBE	[]		
[] Coliform [V] EPH [V PH	303,909	:	4 DEG C HC!/H _と SO ₄ /4°C	(1) 4 OZ Stenie			·····
Cat Trull A. II		C	(PA) (EPH)	0.0	LFJ		
Analysis	Method Number	Fraction Code	Preservation Method	Volume Required	Sample Collected	Sample Bottle ID Numbers	
[√ voc	LM19	sv	4 DEG C	(2) 2OZ AG	<u> </u>	, , ,	
✓ svoc	LM18	SS	40240	(1) 16 OZ AG	سلما		
Pest/PCB	LH16	SS		1	سلو)		
PAL Inorganics	LH10 See Below	S S					
[] Explosives	LW12	ss					_
[TPHC Lead Only	418.1 JD17	SS SS			بسنا	/////////	
[⊮] TOC	415.1	SS		♥			
KYESH/VAH	1311	SS	4 DEG C	(1) 16 ÖZ AG	J.J.	//	
NOTES							
PAL Inorganics: ICP metals (SS10); AS H2O Quality: PO4 (TF27); TKN (TF26);	(SS22); SE (SD2	1); TL (SD09); SB	(SD20); HG (SB01).				. [
All parameters collected as totals, ie: no	n Filtered	+ (1110); 133 (1)	00.2); ALK (301.0); Hardr	IBSS.			
PAL Inorganics: ICP metals (JS16; AS (JD19); SE (JD15);	TL (JD24); SB (J	D25); PB (JD17); HG (JB	10).			
actual start time	= 1015	_					
actual end time	= 1045					FIGURE 4-10	
			AND SEDIME	NT SAMPLE	FIELD DA	ATA RECORD	

PROJECT OPERATIONS PLAN FORT DEVENS, MASSACHUSETTS

ABB Environmental Services, Inc.-

SURFAC	CE WATI	ER AND SE	DIMENT SA	MPLE FIELD	DATA RE	CORD	
Project: Devens			Si	te: Abc 3	57 Arra	3	1
	09144.0	8		ate: 5 21			
Site Identification: 57w~	98-04 8	57D-98-0				-00	
 Time: Start:	Enc	d: <u>122</u>	<u>o</u> s	ignature of Sampl	er: <u>Mar</u>	rey E. Korra	
SURFACE WATER INFORMATION	٧	ىن ۋىلىل	Type of Surfa		Equipment Used	For Collection:	1
Field Sample No. WX570400 Water	er Depth	Fly Out	[] Stream	[]River	[V None, Grab		
Depth of Sample		in grow	1 76	* - '	1. Zo	4 Price Andrew / the I would	Pitter
From Top of Water(ft)			aft Uro Sample Loca	tion Sketch: [] Yes	e map	owl & spoon (sh	þ/c
Spec. Cond. 56 µMHOS/CN	4 ∌ pH 6. 3	3 <u>5</u> Units	Do O	mg/L		700 shall	(لعنام
Field GC Data: [] Field Duplicate Collec	cted		Valentin 14:	•			
Duplicate ID				surements Obtained? Flow Measurement Data I	Record		
SEDIMENT INFORMATION		Equipment Use	d For Collection:	Sedimen	t Type		
Field Sample No. WDS70400		[] Gravity Cor	er	[] Clay	• •		
Depth of Sediment Sample	(ft)	[] S.S. Split S [] Dredge	poon	[]Sano [v/Orga	inic		
	` '	[3/Hand Spoo {] Aluminum I		[] Grav	el (کجینامطد		
Field Gc Data: [] Field Duplicate Collect Duplicate Id	ted	[] SS Bucket	,	7420	with 211	it-black to gre	y bloci
		(W <u>SS</u>)	യമ്പ		lorg.	H-black to gue mat over org. si	indu
		Type Of Sampl	e Collected:	Sample (Observations:	•	21F
		[] Composite		[] Colo	r		
				[]			1
SAMPLES COLLECTED	Method	Faction	Preservation	Volume	Sample	Sample Bottle	
Analysis	Number	Code	Method	Required	Collected	ID Numbers	
[v] voc [v] svoc	UM20 UM18	VP MS	HCL, 4 DEG C 4 DEG C	(4) 40 ML (2) 1 L AG	ly W		
Pest/PCB	UH02	EC	4 DEG C	(2) 1 L AG	iù		
PAL Inorganics (Specified Below)	UH13	N/NF	HNO3 TO pH<2	1 L P-CUBE	W		
[] Lead Only	SD20	N	HNO3 TO pH<2		ii		
[] Explosives	UW19 UW32	LC	4 DEG C	(3) 1 l. AG	[]		
[] TPHC	418.1	0	H2SO4 TO pH<2	1 L AG	[]		
[] TOC	415.1	0	H2SO4 TO pH<2	1 L P-CUBE	[]	/// /	
[] Anions	TF22 TT10	S C	H2SO4 TO pH<2 4 DEG C	1 L P-CUBE 1 L P-CUBE	[]	///	
	310.1	N	HNO3 TO pH<2	1 L P-CUBE	i i		
TSS Only	160.2	C	4 DEG C	1 L P-CUBE	لإمنا	':': ':	
[] H2O Quality (Specified Below)		S C	H2SO4 TO pH<2 4 DEG C	1 L P-CUBE 1 L P-CUBE	[]	///	
		Ň	HNO3 TO pH<2	1 L P-CUBE			ł
[] Coliform	303,909	ملة	4 DEG C 1/H2 SO3/ 4 C	(1) 4 OZ	W	///	
DEBEPH/VFH			H) (EPH)	Sterile			
Analysis	Method Number	Fraction Code	Preservation Method	Volume Required	Sample Collected	Sample Bottle ID Numbers	
[× voc	LM19	SV	4 DEG C	(2) 2OZ AG	M	1 1 1	
[V svoc	LM18	SS	40200	(1) 16 OZ AG	M.		
Y Pest/PCB	LH16	SS			juj -		
PAL inorganics	LH10 See Below	SS			[]	——/ ——/——	
[] Explosives	LW12	SS			[]		
[Y TPHC	418.1	SS			14		
[] Lead Only [ピ TOC	JD17 415.1	SS SS		₩	[]	// /	
M EBHINBH	1311	ss	4 DEG C JMeO	(1) 16 OZ AG	fort		
 DO FLHIAME			4-CAMEO!	1			4

NOTES

PAL Inorganics: ICP metals (SS10); AS (SS22); SE (SD21); TL (SD09); SB (SD20); HG (SB01). H2O Quality: PO4 (TF27); TKN (TF26); NIT (TF22); CL/S04 (TT10); TSS (160.2); ALK (301.0); Hardness. All parameters collected as totals, ie: non Filtered

PAL inorganics: ICP metals (JS16; AS (JD19); SE (JD15); TL (JD24); SB (JD25); PB (JD17); HG (JB10).

FIGURE 4-10
SURFACE WATER AND SEDIMENT SAMPLE FIELD DATA RECORD
PROJECT OPERATIONS PLAN
FORT DEVENS, MASSACHUSETTS

--ABB Environmental Services, Inc.-

		I.K AND SI	DIMENT SAN	200			
Project: Devel Project Number:	09144.	08	Site	· 		1 3	
· · · · · · · · · · · · · · · · · · ·			Date	·::	21/98		4
		1570-98-0			. 1 1/6	E Q	
Time: Start: 1 ユ5〇	Er	nd: <u>1300</u>	Sig	nature of Samp	ler:	incy E. Ro	71
Field Sample No. WX570500 Wa		6" des	Type of Surface [] Stream [] Pond/Lake	Water: [] River [// Seep	Equipment Use [] None, Grab [] Bomb Samp [] Pump Sid	ler	ر د د
	_	18.3 _{Deg. C.}	Sample Location	Sketch: [] Yes	•	*heary floor	1100
Spec. Cond. <u>/ 5 δ</u> μMHOs/C	:M & pH <u>6,</u>	もう Units	100	19/L	٦	*heavy +boo	
Duplicate ID			Velocity Measure [] Yes, See Flo	ements Obtained? w Measurement Data	Record		
SEDIMENT INFORMATION		Equipment Use	ed For Collection:	Sedimer	nt Type:		
Field Sample No. DX 570500		[] Gravity Cor [] S.S. Split S		[]Clay	i i		
Depth of Sediment Sample	1 40	[] Dredge [Y] Hand Spoo		[i]Orga []Grav	/ei		
Field Gc Data: [] Field Duplicate Colle	ected	[] Aluminum F [] SS Bucket		135	117		
Duplicate Id	 	IN SS I	eowi			•	
		Type Of Sampl	e Collected:	,	Observations:		
		Discrete Composite		[] Odoi [] Colo			
		()		,	fe Flo	<u></u>	1
SAMPLES COLLECTED		 					_
Analysis	Method	Faction	Preservation Method	Volume	Sample	Sample Bottle	Ì
	Number	Code		Required	Collected	ID Numbers	İ
✓ voc ✓ svoc	UM20 UM18	VP MS	HCL, 4 DEG C 4 DEG C	(4) 40 ML (2) 1 L AG	[1/		-
Pest/PCB	UH02	EC	4 DEG C	(2) 1 L AG	ij		-
PAL Inorganics (Specified Below)	UH13	NINE	HNO3 TO pH<2	1 L P-CUBE	iv		
[] Lead Only	SD20	N [*]	HNO3 TO pH<2		į į		-
[] Explosives	UW19 UW32	LC	4 DEG C	(3) 1 I. AG	[]	///	-
[] TPHC	418.1	0	H2SO4 TO pH<2	1 L AG	[]		-
[] TOC [] Anions	415.1 TF22	o s	H2SO4 TO pH<2 H2SO4 TO pH<2	1 L P-CUBE	[]		-
[] Almons	TT10	c	4 DEG C	1 L P-CUBE 1 L P-CUBE	[]		:
	310.1	N	HNO3 TO pH<2	1 L P-CUBE	<u>i i</u> _		-
[V] TSS Only [] H2O Quality (Specified Below)	160.2	c s	4 DEG C H2SO4 TO pH<2	1 L P-CUBE 1 L P-CUBE	[4]		-
() ···································		č	4 DEG C	1 L P-CUBE	ii		_
() Californi		N	HNO3 TO pH<2	1 L P-CUBE	[]	!! !	-
[] Coliform [] EPH/VPH	303,909	HCI/H2504/	4 DEG C	(1) 4 OZ Sterile			٠
£4 £1 117 4 1 1		(VPH) (EPH)					
Analysis	Method Number	Fraction Code	Preservation Method	Volume Required	Sample Collected	Sample Bottle ID Numbers	
[1 VOC	LM19	sv	4 DEG C	(2) 2OZ AG	ry		_
[svoc	LM18	SS		(1) 16 OZ AG	iv		-
Pest/PCB	LH16 LH10	SS					-
[PAL Inorganics	See Below	SS			k.		-
[] Explosives	LW12	SS			[]	!!!	-
[) TPHC [] Lead Only	418.1 JD17	SS SS			[4]		-
[v] TOC	415.1	SS		Y	W		-
EJ BAIVPH	1311	SS	4 DEG CAROH	(1) 16 ÖZ AG			-
NOTES							
PAL Inorganics: ICP metals (SS10); AS H2O Quality: PO4 (TF27); TKN (TF26); I	(SS22); SE (SD)21); TL (SD09); SB (S04 (TT10); TSS (16	(SD20); HG (SB01). 0.2): ALK (301.0): Hardn	ess			ļ
All parameters collected as totals, ie: nor PAL Inorganics: ICP metals (JS16; AS (Filtered						
- Frog observed hi	mping	into Hz	.0			FIGURE 4-10	
- Frog observed fur - Heavy floc In 420	SUBEAC		AND SEDIMEI	UT SAMDIE			
in Han	JUNIAL	· TALER	YIAD SEDIME				
120			_			TIONS PLAN	
			j			ACHUSETTS	
				ABB E	nvironmen	tal Services, Inc	

SURFA	CE WATI	ER AND SE	DIMENT SAN	IPLE FIELD	DATA RE	CORD
Project: Deve	2n s		Site	: Auc	57 Art	a 3
Project Number:	09144.	08	Date	10	198	
	1-98-06X	/ 57D-98		·	^_	
Time: Start: 1345				nature of Samp	ler: \/\c	ance F. Kotta
SURFACE WATER INFORMATION	ON		Type of Surface		 	nd For Collection:
Field Sample No. WX570600w	ates Denth	4" 05	[] Stream	[]River	(V) None, Grat	1
	ate: Deptit	(4)	[] Pond/Lake	[Seep	[] Bomb Sam	pler
Depth of Sample From Top of Water (ft) Temperature _	17.7 Deg. C.	Sample Location	n Sketch: [] Yes	E Map	+ PVC tubing/in-line f
Spec. Cond. 51 µMHOS/0	ом врн <u>6.4</u>	OO Units	Turb. 999+, Do 0.36 m	itus ir in se	e map	dua a supon
Field GC Data: [] Field Duplicate Col Duplicate ID	lected		Velocity Measure	ements Obtained? w Measurement Data	Record	ground is saturat
SEDIMENT INFORMATION		Equipment I lea	d For Collection:	Sadi	rt Tugo:	-
Field Sample No. PX570600		[] Gravity Cor		Sedimer [] Clay		
	•	[] S.S. Split S	poon	[i/],San	3	
Depth of Sediment Sample	(ft)	[] Dredge [Hand Spoo	n	[v] Orga [□] Grav		
Field Gc Data: [] Field Duplicate Colle	ected	[] Aluminum I		[ids		
Duplicate Id		[] SS Bucket		1X121		
		N 22 !	30001			
		Type Of Sampl	e Collected:	Sample	Observations:	
		Discrete		[] Odo		
		[] Composite		[] Colo	r	
SAMPLES COLLECTED	Method	Faction	Preservation	Volume	Sample	Sample Bottle
Analysis	Number	Code	Method	Required	Collected	ID Numbers
M soc	UM20 UM18	VP MS	HCL, 4 DEG C 4 DEG C	(4) 40 ML		///
PesyPCB	UH02	EC.	4 DEG C	(2) 1 L AG (2) 1 L AG	N	
	UH13			(-) (-) (-		
PAL Inorganics (Specified Below)		NNF	HNO3 TO pH<2	1 L P-CUBE	M	
[] Lead Only	SD20	N 10	HNO3 TO pH<2	(0) 4 1 4 2	[]	//
[] Explosives	UW19 UW32	LC	4 DEG C	(3) 1 I. AG	l i	
[] TPHC	418.1	0	H2SO4 TO pH<2	1 L AG	[]	
[] TOC	415.1	ō	H2SO4 TO pH<2	1 L P-CUBE	ii	
[] Anions	TF22	s	H2SO4 TO pH<2	1 L P-CUBE	ίi	
	TT10	C	4 DEG C	1 L P-CUBE	[]	
n/Top o-ti	310.1	N	HNO3 TO pH<2	1 L P-CUBE	[]	
✓ TSS Only [] H2O Quality (Specified Below)	160.2	C S	4 DEG C H2SO4 TO pH<2	1 L P-CUBE 1 L P-CUBE	[]	
() 1120 Coality (Specified Below)		Č	4 DEG C	1 L P-CUBE	[]	'/'/
		Ň	HNO3 TO pH<2	1 L P-CUBE	ři.	
[] Coliform	303,909		4 DEG C	(1) 4 OZ		
BY EPH/UPH		H	C1/42504/4°C	Sterile		//
·.	Method	(้ง รั Fraction	H) (EPH) Preservation	Mak	Sample	Sample Bottle
Analysis	Number	Code	Method	Volume Required	Collected	ID Numbers
IV VOC	LM19	sv	4 DEG C	(2) 2OZ AG	1.2	
Svoc	LM18	SS	-500	(1) 16 OZ AG	13	
Pest/PCB	LH16	SS		(1)	i'A'	
	LH10			Ì	[].	
PAL Inorganics	See Below	SS		1		
[] Explosives	LW12	SS			<u>[</u>	/,/, /
TPHC	419 1	52		1		
TPHC Lead Only	418.1 JD17	SS SS		1	[]	
[] Lead Only [✔] TOC	418.1 JD17 415.1	SS SS		₩		
[] Lead Only	JD17	SS	4 DEG C	(1) 16 OZ AG		

PAL Inorganics: ICP metals (SS10); AS (SS22); SE (SD21); TL (SD09); SB (S020); HG (SB01).
H2O Quality: PO4 (TF27); TKN (TF26); NIT (TF22); CL/S04 (TT10); TSS (160.2); ALK (301.0); Hardness.
All parameters collected as totals, ie: non Filtered

PAL Inorganics: ICP metals (JS16; AS (JD19); SE (JD15); TL (JD24); SB (JD25); PB (JD17); HG (JB10).

FIGURE 4-10 SURFACE WATER AND SEDIMENT SAMPLE FIELD DATA RECORD PROJECT OPERATIONS PLAN FORT DEVENS, MASSACHUSETTS

—ABB Environmental Services, Inc.-

SURFA	CE WAT	ER AND SE	DIMENT SAN	APLE FIELD	DATA RE	CORD
Project: Deve	ns		Site	: Aoc	57 An	ea 3
	17144.08		Date			
Site Identification: 570	-98-07X /	57W-98-0			 	- 2 8
Time: Start: 1435				nature of Samp	oler: <u>Mar</u>	ncy E. Roka
SURFACE WATER INFORMATION	ON		Type of Surface	Water:	Equipment Use	d For Collection:
Field Sample No. WX570700 W	ater Depth	<u>6</u>	[] Stream [] Pond/Lake	[]River [v/Seep	Mariane, Grab	
Depth of Sample From Top of Water (#	} Temperature	20.2000	Sample Locatio			1 PVC tubing/in-line
Spec. Cond. 50 µMHOS/0	· · -	Units	Turb, 999+	tus IN No S	so wat	¿dua a
			* ()	19/1	·	Summ
Field GC Data: [] Field Duplicate Col Duplicate ID	lected		Velocity Measur	ements Obtained? ow Measurement Data	Record	ignormal is
SEDIMENT INFORMATION		Equipment Lise	ed For Collection:			saturated)
Field Sample No. DX 57070	3	[] Gravity Cor	er	[] Clay	nt Type: /	
	: 5	[] S.S. Split S [] Dredge	poon	[V/San [V/Org	d anic	
Depth of Sediment Sample	<u> </u>	(Hand Spoo		[] Gra		
Field Gc Data: [] Field Duplicate Coll	ected	[] Aluminum [[] SS Bucket	Pans	WS	717	
Ouplicate Id		M SS 6	અમો			
		Type Of Sampl	e Collected:	Sample	Observations:	
		[✔] Discrete [] Composite		[V] Odd [] Cold	r <u>#125</u>	
		() Composite		[]		
SAMPLES COLLECTED						
Analysis	Method Number	Faction Code	Preservation Method	Volume Required	Sample Collected	Sample Bottle ID Numbers
(Voc	UM20	VP	HCL, 4 DEG C	(4) 40 ML	19	
[] SVOC [] Pest/PCB	UM18 UH02	MS EC	4 DEG C 4 DEG C	(2) 1 L AG (2) 1 L AG	W	
	UH13		•		191	
[✔ PAL Inorganics (Specified Below) [] Lead Only	SD20	NNF	HNO3 TO pH<2 HNO3 TO pH<2	1 L P-CUBE	M	
[] Explosives	UW19	LC	4 DEG C	(3) 1 l. AG	[]	
() 7000	UW32	_		• •	. ,	
[]TPHC []TOC	418.1 415.1	0	H2SO4 TO pH<2 H2SO4 TO pH<2	1 L AG 1 L P-CUBE	[]	/,/,/,
[] Anions	TF22	š	H2SO4 TO pH<2	1 L P-CUBE	1 1	
	TT10	С	4 DEG C	1 L P-CUBE	ii	//
M TSS Only	310.1	N C	HNO3 TO pH<2	1 L P-CUBE	[]	
[] H2O Quality (Specified Below)	160.2	S	4 DEG C H2SO4 TO pH<2	1 L P-CUBE 1 L P-CUBE	[7]	';';',
,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,		C	4 DEG C	1 L P-CUBE	ίi	
() 0 %		N	HNO3 TO pH<2	1 L P-CUBE		///
[] Coliform [V] EPH/UPH	303,909	HC (UBH)	4 DEG C 1/ H2SO4/4°C	(1) 4 OZ Stenie	M	
Analysis	Method Number	(VPH) Fraction Code	Preservation Method	Volume	Sample Collected	Sample Bottle ID Numbers
[N/VOC	LM19	SV	4 DEG C	Required (2) 2OZ AG		/ / /
IN SVOC	LM18	SS	40000	(2) 202 AG (1) 16 OZ AG		
Pest/PCB	LH16	SS		1	iu	
C XPAL Income	LH10	00				
PAL Inorganics Explosives	See Below LW12	SS SS			(i)	
TPHC	418.1	SS				'/'/
Lead Only	JD17	SS		<u> </u>	ii	
TOC	415.1	SS se	4.050.0	(1) 10 9	ių 🗀	/
LA TCLP WITH	1311	SS	4 DEG C	(1) 16 ÓZ AG	1	

NOTES

PAL Inorganics: ICP metals (SS10); AS (SS22); SE (SD21); TL (SD09); SB (SD20); HG (SB01). H2O Quality: PO4 (TF27); TKN (TF26); NIT (TF22); CU/S04 (TT10); TSS (160.2); ALK (301.0); Hardness All parameters collected as totals, ie: non Filtered

PAL Inorganics: ICP metals (JS16; AS (JD19); SE (JD15); TL (JD24); SB (JD25); PB (JD17); HG (JB10).

FIGURE 4-10
SURFACE WATER AND SEDIMENT SAMPLE FIELD DATA RECORD
PROJECT OPERATIONS PLAN
FORT DEVENS, MASSACHUSETTS

SURFA	CE WATI	ER AND SE	DIMENT SAM	IPLE FIELD	DATA RE	CORD
Project: Devens			Site	AOC	57 Area	3
	44.08		Date		2/198	
Site Identification: 57w-		1570-98-		·	211	
					·······································	mey E Rotal
Time: Start: 1310	End	t: <u>133</u> 6) Sig	nature of Sampl	er:	8144 C. 140
SURFACE WATER INFORMATIO	N		Type of Surface		Equipment Use	d For Collection:
Field Sample No. WX570300 Wat	ter Depth	6 /08	[] Stream	[] River	[] None, Grab	
Depth of Sample	-	 /	[] Pond/Lake	[1]/Seep	[] Bomb Samp	+ FVC tubing (in-line
From Top of Water (ft)	Temperature 5	<u>වං, 6</u> _{Deg. C.}	Sample Location	Sketch: [] Yes	•	The treating the
	_		Turb. 999t,	SE ON NI ZUTY	e map	
Spec. Cond. 103 µMHOS/C	м фрн 6.	Units	7.		1	·
Field GC Data: [] Field Duplicate Colle	ected			g/L		
Duplicate ID		-	[] Yes, See Flo	ements Obtained? w Measurement Data F	Record	
SEDIMENT INFORMATION						
		Equipment Used [] Gravity Core	d For Collection: er	Sedimen	• •	
Field Sample No. DX570 800) . ')	[] S.S. Split Sp		[M] Sand		
Depth of Sediment Sample	5 ,46	[] Dredge		[√] Orga	nic	
-	·	Hand Spoor Aluminum P		[] Grav		
Field Gc Data: [] Field Duplicate Colle	cted	SS Bucket		र्षि इं	1+	
Duplicate Id	·····	14 35 b	owl			
		Type Of Sample	Collected:	Samala	Observations:	
		[v] Discrete	Conscied.	[] Odor		
		[] Composite		[] Colo		
				[]		
SAMPLES COLLECTED						
Analysis	Method Number	Faction Code	Preservation Method	Volume Required	Sample Collected	Sample Bottle ID Numbers
iv voc		VP			7:6	10 140110613
VSVOC	UM20 UM18	MS	HCL, 4 DEG C 4 DEG C	(4) 40 ML (2) 1 L AG	M.	
PesvPCB	UH02	EC	4 DEG C	(2) 1 L AG	M	
PAL Inorganics (Specified Below)	UH13	N/NF	HNO3 TO pH<2	1 L P-CUBE	[V	 //
[] Lead Only	SD20	N	HNO3 TO pH<2	121-0052		
[] Explosives	UW19	LC	4 DEG C	(3) 1 I. AG	[]	/
[] TPHC	UW32 418.1	0	H2SO4 TO pH<2	1 L AG	[]	/ / /
[] TOC	415.1	ŏ	H2SO4 TO pH<2	1 L P-CUBE	[]	
[] Anions	TF22	S	H2SO4 TO pH<2	1 L P-CUBE	[]	
	TT10 310.1	C N	4 DEG C HNO3 TO pH<2	1 L P-CUBE 1 L P-CUBE		
TSS Only	160.2	C	4 DEG C	1 L P-CUBE	W	
[] H2O Quality (Specified Below)		s	H2SO4 TO pH<2	1 L P-CUBE	ίi	
		C	4 DEG C	1 L P-CUBE	[]	
[] Coliform		N	HNO3 TO pH<2	1 L P-CUBE	[]	
	202 000		4 DEG C			/
	303,909		4 DEG C	(1) 4 OZ Sterile	1.7	/ / / I
	303,909		1/H2SO4/4°C	Sterile	讨	
EN EPH/VPH	Method	HC (VP) Fraction	1/H ₂ SO ₄ /4°C 1) (EPH) Preservation	Sterile	Sample	Sample Bottle
ET EPH/UPH Analysis	Method Number	Fraction Code	Method	Sterile Volume Required	,	Sample Bottle ID Numbers
EN EPHNPH Analysis W VOC	Method Number LM19	Fraction Code SV	1/H ₂ SO ₄ /4°C 1) (EPH) Preservation	Volume Required (2) 2OZ AG	Sample Collected	Sample Bottle ID Numbers
EN EPH/UPH Analysis [V VOC IJ SVOC	Method Number LM19 LM18	Fraction Code SV SS	Method	Sterile Volume Required	Sample Collected	Sample Bottle ID Numbers
EN EPH/UPH Analysis (V VOC	Method Number LM19	Fraction Code SV	Method	Volume Required (2) 2OZ AG	Sample Collected	Sample Bottle ID Numbers
Analysis [V VOC [V SVOC [V Pest/PCB [Y PAL Inorganics	Method Number LM19 LM18 LH16	Fraction Code SV SS SS SS	Method	Volume Required (2) 2OZ AG	Sample Collected	Sample Bottle ID Numbers
Analysis VOC SYOC Pest/PCB PAL Inorganics Explosives	Method Number LM19 LM18 LH16 LH10 See Below LW12	Fraction Code SV SS SS SS SS	Method	Volume Required (2) 2OZ AG	Sample Collected	Sample Bottle ID Numbers
Analysis [V VOC [V SVOC [V Pest/PCB Y PAL Inorganics [] Explosives [V TPHC	Method Number LM19 LM18 LH16 LH10 See Below LW12 418.1	Fraction Code SV SS SS SS SS SS SS	Method	Volume Required (2) 2OZ AG	Sample Collected	Sample Bottle ID Numbers
Analysis [V VOC [V SVOC [V PesuPCB Y PAL Inorganics [] Explosives [V TPHC [] Lead Only	Method Number LM19 LM18 LH16 LH10 See Below LW12 418.1 JD17	Fraction Code SV SS SS SS SS SS SS SS SS	Method	Volume Required (2) 2OZ AG	Sample Collected Simple Collected	Sample Bottle ID Numbers
Analysis [V VOC [V SVOC [V Pest/PCB Y PAL Inorganics [] Explosives [V TPHC	Method Number LM19 LM18 LH16 LH10 See Below LW12 418.1	Fraction Code SV SS SS SS SS SS SS	Method	Volume Required (2) 2OZ AG (1) 16 OZ AG	Sample Collected	Sample Bottle ID Numbers

PAL Inorganics: ICP metals (SS10); AS (SS22); SE (SD21); TL (SD09); SB (SD20); HG (SB01). H2O Quality: PO4 (TF27); TKN (TF26); NIT (TF22); CL/S04 (TT10); TSS (160.2); ALK (301.0); Hardness. All parameters collected as totals, ie: non Filtered

PAL Inorganics: ICP metals (JS16; AS (JD19); SE (JD15); TL (JD24); SB (JD25); PB (JD17); HG (JB10).

FIGURE 4-10 SURFACE WATER AND SEDIMENT SAMPLE FIELD DATA RECORD PROJECT OPERATIONS PLAN FORT DEVENS, MASSACHUSETTS SURVEY DATA

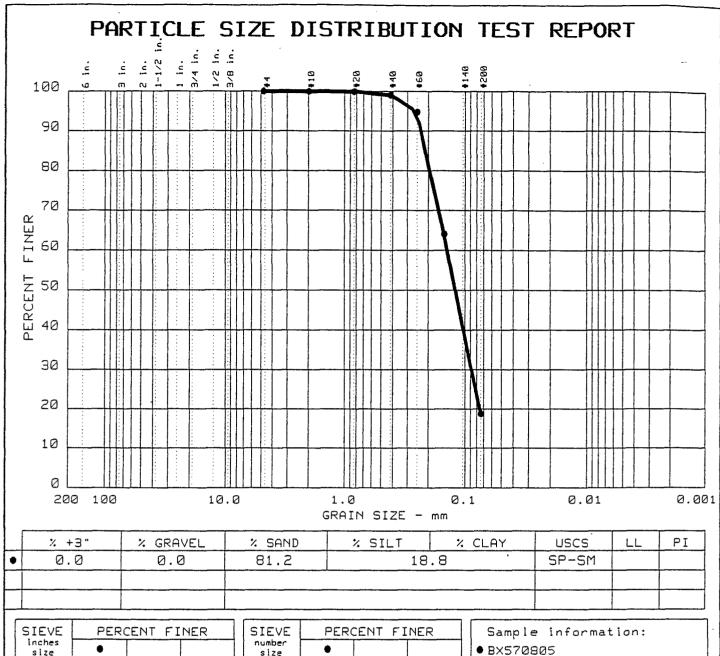
Table I-1 MONITORING WELL AND PIEZOMETER DATA AOC 57

REMEDIAL INVESTIGATION REPORT FORT DEVENS, MA

WELL	NORTH	EAST	TOP OF PVC	GROUND ELEVATION
G3M-92-02X	562277	575908	251	249.11
G3M-92-07X	562586	576145	251.88	249.97
57M-95-01X	562062.51	576806.44	248.19	245.70
57M-95-02X	561853.36	575850.79	242.16	239.97
57M-95-03X	562331.40	576954.31	234.97	232.48
57M-95-04A	561870.62	576382.18	223.83	222.68
57M-95-04B	561863.18	576381.34	224.67	222.38
57M-95-05X	561952.54	576228.93	237.31	234.87
57M-95-06X	562051.57	576463.95	236.56	234.42
57M-95-07X	561825.75	576248.67	224.57	223.36
57M-95-08A	561934.81	576468.16	224.11	222.67
57M-95-08B	561932.96	576475.11	224.70	222.24
57M-96-09X	562419.79	576853.00	242.62	240.24
57M-96-10X	562293.21	577012.99	229.55	227.09
57M-96-11X	562225.94	576968.72	224.38	222.18
57M-96-12X	562240.19	576870.69	227.87	224.82
57M-96-13X	562193.54	576811.74	227.73	225.06
57P-95-01A	561695.11	576211.02	223.29	222.00
57P-95-01B	561695.11	576211.02	223.10	222.00

GEOTECHNICAL DATA (GRAIN SIZE)

Harding Lawson Associates



SIEVE	PERC	ENT FI	NER
inches size	•		
>	GR	AIN SI	ZE
D 60 D 30 D 10	0.14 0.09		
><	COE	FFICIE	NTS
د م ں			

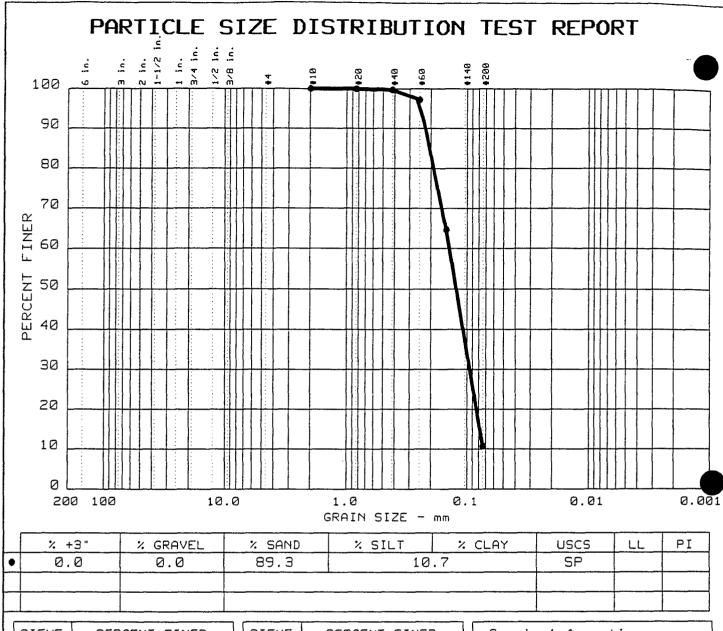
SIEVE	PERO	ENT	FΙ	NER
number size	•			
. 4 10 20 40 60 100 200	100.0 100.9 99.0 94.1 18.8			

Jampie	Informacio
● B×57080	35
F SAND;	Lttl Si;
Tr M ar	d C Sa.

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Project No.: 09144.08 Project: FORT DEVENS

Date: 10/10/96



SIEVE	PER	CENT FI	NER
inches size	•		
	GR	AIN SI	ZE
D ₆₀ D ₃₀ D ₁₀	GR 0.14 0.10	AIN SI	2E
1 D30	0.14 0.10	AIN SI. FFICIEI	

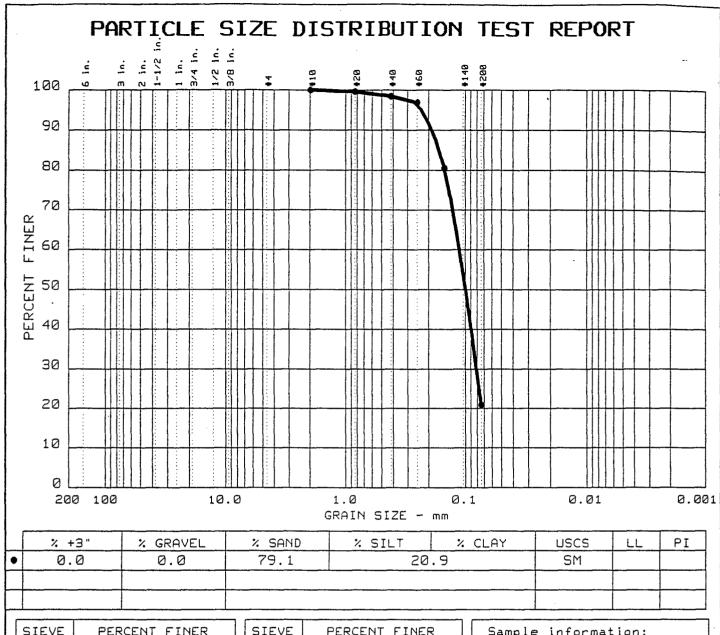
SIEVE	PERC	CENT	FΙ	NER
number size	•			
10 20 40 60 100 200	100.0 99.9 99.7 97.2 64.7 10.7			

) 5	ambie	intori	natio	n:		
● B>	x570909	5				
F	SAND;	Lttl	Si;	Tr	Μ	Sa.

ABB Environmental Services, Inc.

Project No.: 09144.08 Project: FORT DEVENS

Date: 10/10/96



SIEVE	PERC	ENT FI	NER
size	•		
><	GR	AIN SI	ZE
D ₆₀	0.11		
D 30	0.08		
D ₁₀			
	<u> </u>	L	l
	COF	FFICIF	NTS
\geq	COE	FFICIE	NTS
Wo"	COE	FFICIE	NTS

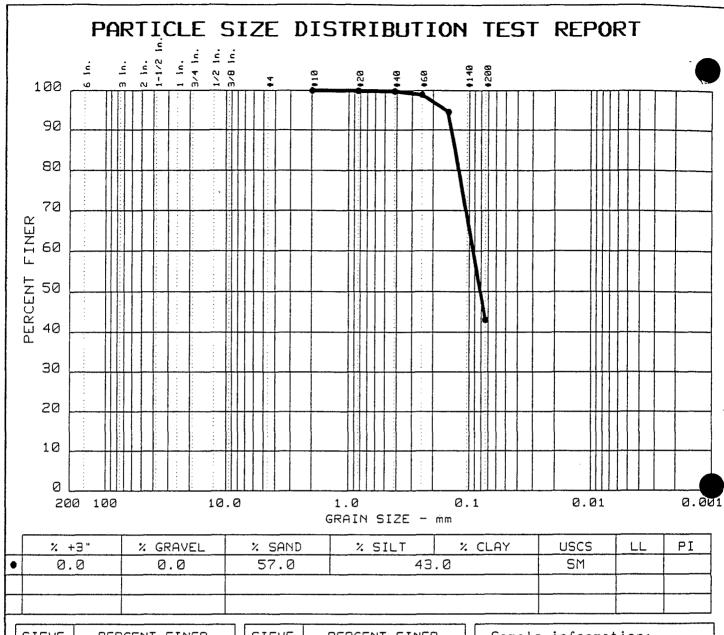
SIĘVE	Р	ER	CENT	FI	NER	
number size	•					
10 20 40 60 100 200	100 99 98 96 80 20	.6 .4 .8				

Sambre	into	ormat	ion:	•	
● BX57100	15				
F SAND;	Sm	Si;	Tr	Μ	Sa.

ABB Environmental Services, Inc.

Project No.: 09144.08
Project: FORT DEVENS

Date: 10/10/96



SIEVE	PERCENT FINER			
inches size	•			
			:	
$\overline{}$	GRAIN SIZE			
Dea	0.09			
D 30	0.09			
D 60 D 30 D 10	0.09			
D 30		FFICIFI	NTS	
D 30		FFICIE	NTS	
D 30		FFICIE	NTS	

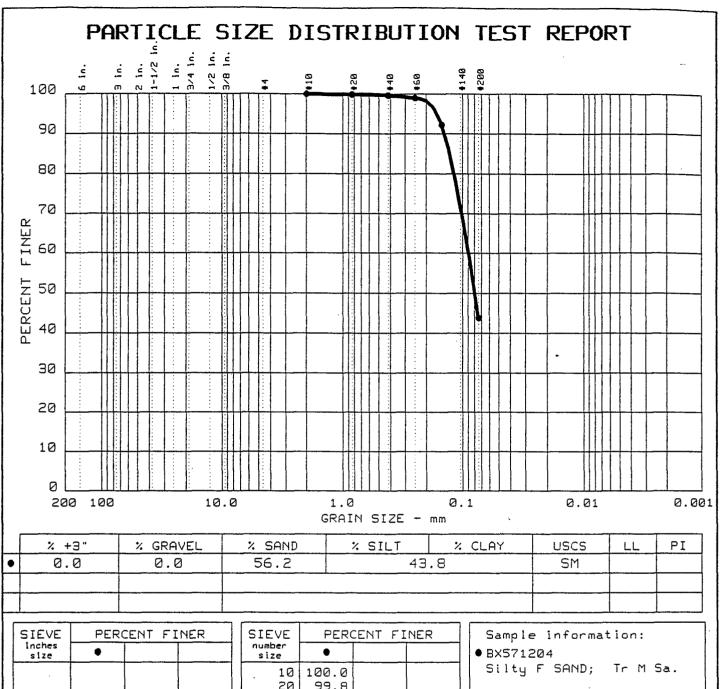
SIEVE	PERCENT FINER			NER
number size	•			
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ABB Environmental Services, Inc.

Project No.: 09144.08 Project: FORT DEVENS

Date: 10/10/96



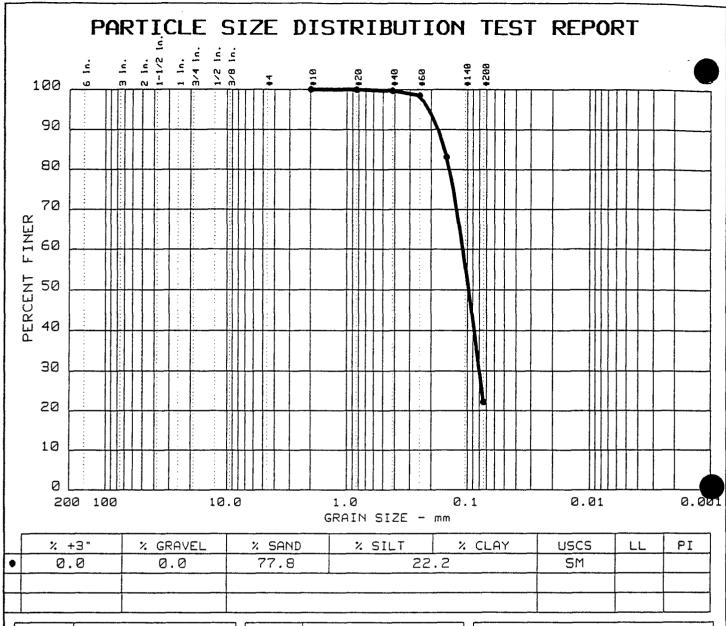
SIEVE Inches	PERCENT FINER		
><	GRAIN SIZE		
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SIEVE	PERCENT FINER			NER	
number size	•				
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ABB Environmental Services, Inc.

Project No.: 09144.08 Project: FORT DEVENS

Date: 10/10/96



SIEVE	PER	CENT FI	NER
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		!	
>><	. GR	AIN SI	ZE
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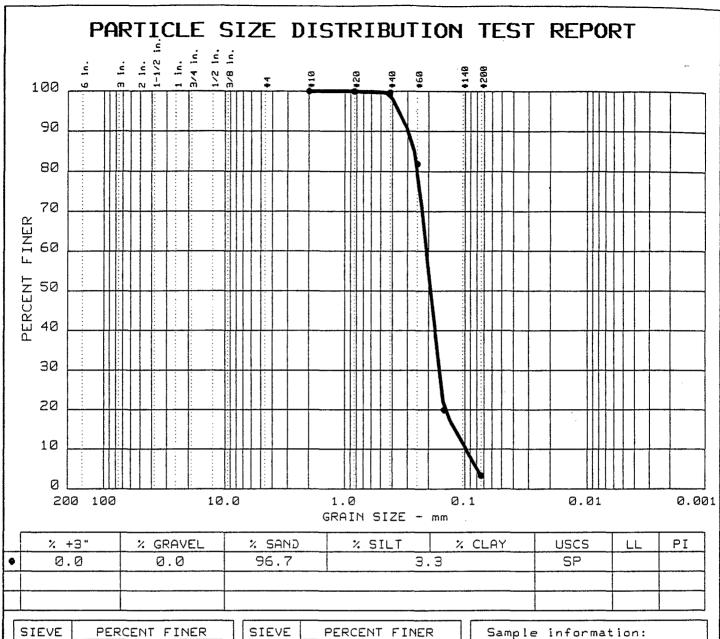
SIEVE	PERCENT FINER		
number size	•		
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•	B×	(57130	5				
	F	SAND;	Sm	Si;	Tr	M	Sa.

ABB Environmental Services, Inc.

Project: No.: 09144.08 Project: FORT DEVENS

Date: 10/10/96



SIEVE	PERC	ENT FI	NER
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$\geq \leq$	GR	AIN SI	ZE
D ₆₀	0.21	,	
D 30	0.16		
D ₁₀	0.09		
	COE	FFICIE	NTS
Cc	1.29		
c.	2.1		

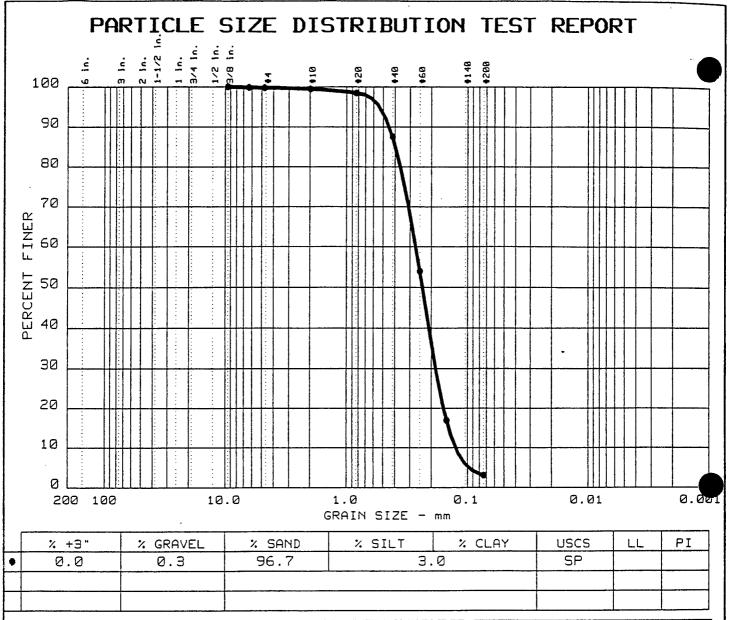
SIEVE	PERCENT FINER			NER
number size	•			
10 20 40 60 100 200	100.0 99.6 99.6 81.9 20.3			

Jab			•
● EF572	2810		
F SAI	ND; Tr	Si an	d M Sa.

ABB Environmental Services, Inc.

Project No.: 09144.08 Project: FORT DEVENS

Date: 10/10/96



SIEVE	PERC	CENT FI	NER
inches size	•		
0.375 0.25	100.0 99.8		
>>	GR	AIN SI	ZE
D 6 0 0 1 0	0.27 0.18 0.12		
>>	COE	FFICIE	YTS
0 0	1.00 2.2		

SIEVE	PERC	CENT FI	NER
number size	•		
4 10 20 40 60 100 200	99.7 99.4 98.4 87.5 54.9 3.1		

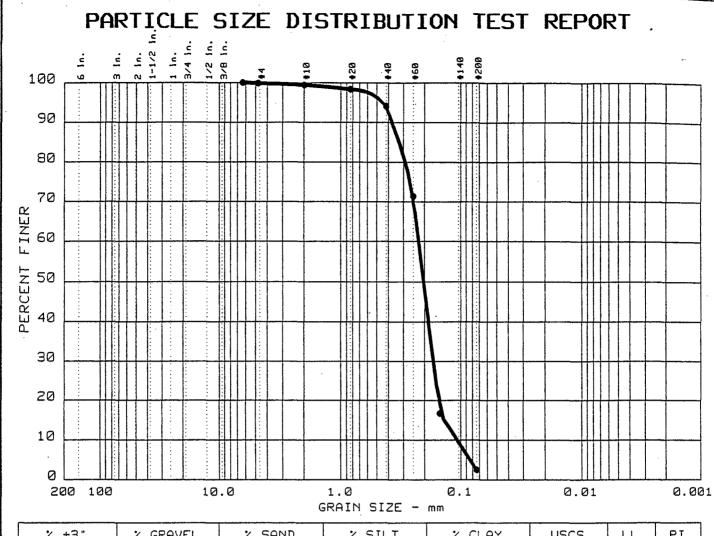
Sample information: ●EX572911 F SAND; Tr M Sa and Si.

Remarks: SIEVE ANALYSIS

ABB Environmental Services, Inc.

Project No.: 09144.08 Project: FORT DEVENS

Date: 10/10/96



	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	LL	ΡI
•	0.0	0.2	97.4	2.	. 4	SP		
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Sample information:

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F SAND; Tr M and C Sa and Si.

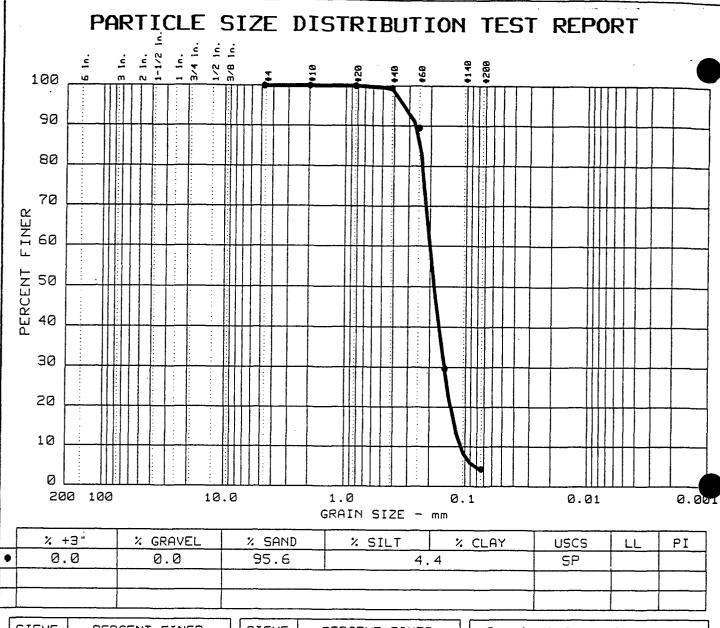
Remarks:

SIEVE ANALYSIS

ABB Environmental Services, Inc.

Project No.: 09144.08
Project: FORT DEVENS

Date: 10/10/96



SIEVE	PER	CENT F	NER
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D ₃₀	0.10	FFICIE	NTS
D30	Ø.10 COE	FFICIE	NTS

SIEVE	PER	CENT	FI	NER	
number size	•				
4 10 20 40 60 100 200	100.0 100.0 100.0 99.4 89.4 29.6 4.4				
,					

Sample information: ● 57M-96-09X F SAND; Tr M and C Sa and Si.

Remarks: SIEVE ANALYSIS

ABB Environmental Services, Inc.

Project No.: 09144.08 Project: FORT DEVENS

Date: 10/10/96

PROJECT ANALYTE LIST

Harding Lawson Associates

APPENDIX K PROJECT ANALYTE LIST

REMEDIAL INVESTIGATION REPORT DEVENS, MASSACHUSETTS

TEST NAME	PARAMETER NAME	SOIL	IL UNIT	WATER	ER UNIT
PAL INORGANICS					
AL	ALUMINUM	2.35	6/6n	141	l/bn
SB	ANTIMONY	0.109	6/6n	3.03	l/bn
AS	ARSENIC	0.25	6/6n	2.54	l/bn
ВА	BARIUM	5.18	₫/gu	5	l/bn
BE	BERYLLIUM	0.5	6/6n	5	l/gu
CD	САБМІЙМ	0.7	6/6n	4.01	l/gn
CA	CALCIUM	100	6/6n	500	l/gu
CR	CHROMIUM	4.05	6/6n	6.02	l/gn
00	COBALT	1.42	b∕bn	25	l/ɓn
CU	COPPER	0.965	6/6n	8.09	l/bn
Ш	IRON	3.68	₫/ɓn	38.8	l/bn
PB	LEAD	0.177	B/Bn	1.26	l/bn
MG	MAGNESIUM	100	6/6n	500	l/ɓn
MN	MANGANESE	2.05	₫/gn	2.75	l/bn
HG	MERCURY	0.05	6/6n	0.243	l/bn
Z	NICKEL	1.71	∂/ɓn	34.3	l/bn
×	POTASSIUM	100	₫/gu	375	l/gn
SE	SELENIUM	0.25	∂/ɓn	3.02	l/gu

APPENDIX K PROJECT ANALYTE LIST

REMEDIAL INVESTIGATION REPORT DEVENS, MASSACHUSETTS

		SOIL		WATER	
TEST NAME	PARAMETER NAME	CRL	UNIT	CPL	UNIT
AG	SILVER	0.589	6/6n	4.6	l/gu
NA	SODIUM	100	6/6n	500	l/gu
T	THALLIUM	0.319	g/gn	6.99	l/ɓn
^	VANADIUM	3.39	6/6n	11	l/ɓn
ZN	ZINC	8.03	g/gn	21	l/bn
PAL EXPLOSIVES					
135TNB	1,3,5-TRINITROBENZENE	0.488	6/6n	0.449	l/bn
13DNB	1,3-DINITROBENZENE	0.496	g/gu	0.611	l/gu
246TNT	2,4,6-TRINITROTOLUENE	0.456	6/6n	0.635	l/ɓn
24DNT	2,4-DINITROTOLUENE	0.424	g/gn	0.0637	l/bn
26DNT	2,6-DINITROTOLUENE	0.524	6/6n	0.0738	l/ɓn
НМХ	CYCLOTETRAMETHYLENETETRANITRAMINE	0.666	6/6n	1.21	l/gn
NB	NITROBENZENE	2.41	b/bn	0.645	l/bn
RDX	CYCLONITE	0.587	6/6n	1.17	l/bn
TETRYL	NITRAMINE	0.731	6∕6n	1.56	l/bn
NG	NITROGLYCERINE	4	ng/g	10	l/bn
PETN	PENTAERYTHRITOL TETRANITRATE	4	6/6n	20	l/bn

APPENDIX K PROJECT ANALYTE LIST

REMEDIAL INVESTIGATION REPORT DEVENS, MASSACHUSETTS

		TIOS		WATE	WATER
TEST NAME	PARAMETER NAME	CRL	UNIT	CRL	UNIT
PAL ANIONS/CATIONS	ONS				
НСОЗ	BICARBONATE	NA		Ϋ́	l/gn
ರ	CHLORIDE	NA		2,120	l/gu
SO4	SULFATE	NA		10,000	l/bn
NO3	NITRATE	NA		10	l/bn
CA	CALCIUM	NA		200	l/Bn
×	POTASSIUM	NA		375	l/bn
MG	MAGNESIUM	NA		500	l/bn
PAL WATER QUAI	PAL WATER QUALITY PARAMETERS				
ರ	CHLORIDES	NA		2,120	l/gu
N2KJEL	TOTAL NITROGEN	NA		183	l/bn
NIT	NO3-N	NA		10	l/bn
804	SULFATES	NA.		10,000	l/gu
TPO4	TOTAL PHOSPHORUS	NA		13.3	l/bn
	HARDNESS	NA		NA	l/bn
ALK	ALKALINITY	NA		NA	l/bn
TSS	TOTAL SUSPENDED SOLIDS	NA		NA	l/gu
DO	DISSOLVED OXYGEN	NA		NA	l/bn
					and the

APPENDIX K PROJECT ANALYTE LIST

REMEDIAL INVESTIGATION REPORT DEVENS, MASSACHUSETTS

ST	AMETER	CBL	T NO	CRL	LNO
PAL ORGANICS V	PAL ORGANICS VOLATILE COMPOUNDS				
111TCE	1,1,1-TRICHLOROETHANE	0.0044	6/6n	0.5	l/Bn
112TCE	1,1,2-TRICHLOROETHANE	0.0054	6/6n	1.2	l/gu
11DCE	1,1-DICHLOROETHYLENE/ 1,1-DICHLOROETHENE	0.0039	6/6n	0.5	l/bn
11DCLE	1,1-DICHLOROETHANE	0.0023	6/6n	0.68	l/gu
12DCE	1,2-DICHLOROETHYLENES, TOTAL (CIS AND TRANS ISOMERS)	0.003	6/6n	0.5	l/bn
12DCLE	1,2-DICHLOROETHANE	0.0017	6/6n	0.5	l/gu
12DCLP	1,2-DICHLOROPROPANE	0.0029	6/6n	0.5	l/gu
ACET	ACETONE	0.017	6/6n	13	l/gu
BRDCLM	BROMODICHLOROMETHANE	0.0029	6/6n	0.59	l/bn
C2H3CL	CHLOROETHENE/VINYL CHLORIDE	0.0062	6/6n	2.6	l/bn
C2H5CL	CHLOROETHANE	0.012	6/6n	1.9	l/gu
СеНе	BENZENE	0.0015	b/bn	0.5	l/gu
CCL4	CARBON TETRACHLORIDE	0.007	6/6n	0.5	l/gu
CH2CL2	METHYLENE CHLORIDE	0.012	6/6n	2.3	l/gu
СНЗВВ	BROMOMETHANE	0.0057	6/6n	5.8	l/gu
СНЗСГ	CHLOROMETHANE	0.0088	6/6n	3.2	i/bn

APPENDIX K PROJECT ANALYTE LIST

REMEDIAL INVESTIGATION REPORT DEVENS, MASSACHUSETTS

		TIOS		WATER	ER
TEST NAME		CRL	UNIT	CRL	LIND
CHBR3	ВКОМОЕОЯМ	0.0069	6/6n	2.6	l/gu
C13DCP	CIS-1,3-DICHLOROPROPYLENE C+S-1,3-DICHLOROPROPENE	0.0032	6/6n	0.58	I/ɓn
CHCL3	СНГОВОГОВМ	0.00087	b/bn	0.5	l/Bn
CL2CH2	DICHLOROMETHANE	12	6/6n	2.3	i/bn
CLC6H5	CHLOROBENZENE	0.00086	6/6n	0.5	l/bn
CS2	CARBON DISULFIDE	0.0044	b/bn	0.5]/bn
DBRCLM	DIBROMOCHLOROMETHANE	0.0031	6/6n	0.67	l/gu
ETC6H5	ETHYLBENZENE	0.0017	6/6n	0.5	l/bn
MEC6H5	TOLUENE	0.00078	6/6n	0.5	l/bn
MEK	METHYLETHYL KETONE/2-BUTANONE	0.07	6/6n	6.4	l/gu
MIBK	METHYLISOBUTYL KETONE	0.027	6/bn	3	l/bn
MNBK	METHYL-N-BUTYL KETONE/2-HEXANONE	0.032	g/gn	3.6	l/gu
STYR	STYRENE	0.0026	6/6n	0.5	l/bn
T13DCP	TRANS-1,3-DICHLOROPROPENE	0.0028	6/6n	0.7	l/gu
TCLEA	1,1,2,2-TETRACHLOROETHANE	0.0024	6/6n	0.51	l/gu
TCLEE	TETRACHLOROETHYLENE/ TETRACHLOROETHENE	0.00081	g/gn	1.6	l/ɓn

APPENDIX K PROJECT ANALYTE LIST

REMEDIAL INVESTIGATION REPORT DEVENS, MASSACHUSETTS

SST NAME EEN CB CCB CCB CCB CCB CCB CCB CCB CCB CCB		TIOS		WATER	B
TRICHLOROTHYLENE/TRICHLOROETHE XYLENES, TOTAL COMBINED 1,2,4-TRICHLOROBENZENE 1,3-DICHLOROBENZENE 1,4-DICHLOROBENZENE 1,4-DICHLOROBENZENE 2,4,5-TRICHLOROPHENOL 2,4-DICHLOROPHENOL 2,4-DIMETHYLPHENOL 2,4-DINITROPHENOL 2,4-DINITROPHENOL 2,4-DINITROPHENOL 2,6-DINITROTOLUENE 2,6-DINITROTOLUENE 2-CHLOROPHENOL	1/2017	CRL	UNIT	CAL	LIND
GANICS SEI	TRICHLOROTHYLENE/TRICHLOROETHENE	0.0028	6/6n	0.5	l/gu
GANICS SEI	XYLENES, TOTAL COMBINED	1.5	6/6n	0.84	l/gn
	S SEMIVOLATILE COMPOUNDS				
	1,2,4-TRICHLOROBENZENE	0.04	6/6n	1.8	l/gu
	1,2-DICHLOROBENEZENE	0.11	g/gn	1.7	l/gu
	1,3-DICHLOROBENZENE	0.13	g/gn	1.7	l/gu
	1,4-DICHLOROBENZENE	0.098	6/6n	1.7	l/gu
	2,4,5-TRICHLOROPHENOL	0.1	b/bn	5.2	l/gu
AP AP	2,4,6-TRICHLOROPHENOL	0.17	ng/g	13	l/bn
AP	2,4-DICHLOROPHENOL	0.18	ug/g	2.9	l/bn
17 TT 94P	2,4-DIMETHYLPHENOL	0.69	ug/g	5.8	l/bn
1T 4P 4P	2,4-DINITROPHENOL	1.2	g/gn	21	l/bn
1T 4P AP	2,4-DINITROTOLUENE	0.14	ng/g	4.5	l/bn
4P	2,6-DINITROTOLUENE	0.085	ng/g	0.79	l/bn
dt da	2-CHLOROPHENOL	0.06	ug/g	0.99	l/bn
ΑP	2-CHLORONAPHTHALENE	0.036	ug/g	0.5	l/gn
	2-METHYLNAPHTHALENE	0.049	ug/g	1.7	l/gu
ZMP 2-METHYLPHENOL/2-CRESOL	2-METHYLPHENOL/2-CRESOL	0.029	6/6n	3.9	l/bn

APPENDIX K PROJECT ANALYTE LIST

REMEDIAL INVESTIGATION REPORT DEVENS, MASSACHUSETTS

		SOIL	_	WATER	i.R
TEST NAME	PARAMETER NAME	CRL	UNIT	CRL	UNIT
2NANIL	2-NITROANILINE	0.062	6/6n	4.3	l/gu
2NP	2-NITROPHENOL	0.14	B∕Bn	3.7	l/gu
зэрсвр	3,3'-DICHLOROBENZIDINE	6.3	6/6n	12	l/gn
3NANIL.	3-NITROANILINE	0.45	6/6n	4.9	l/gu
46DN2C	4,6-DINITRO-2-CRESOL/ METHYL-4,6-DINITROPHENOL	0.55	a/an	17	l/ɓn
4BRPPE	4-BROMOPHENYLPHENYL ETHER	0.033	6/6n	4.2	l/gu
4CANIL	4-CHLOROANILINE	0.81	6/6n	7.3	l/gu
4CL3C	4-CHLORO-3-CRESOL/ 3-METHYL-4-CHLOROPHENOL	0.095	a/an	4	l/gu
4CLPPE	4-CHLOROPHENYLPHENYL ETHER	0.033	b/bn	5.1	.l/gu
4MP	4-METHYLPHENOL/4-CRESOL	0.24	g/gu	. 0.52	l/gu
4NANIL	4-NITROANILINE	0.41	6/6n	5.2	l/gu
4NP	4-NITROPHENOL	1.4	g/gu	12	ng/l
ANAPNE	ACENAPHTHENE	0.036	6/6n	1.7	l/gu
ANAPYL	ACENAPHTHYLENE	0.033	6/6n	0.5	l/gu
ANTRC	ANTHRACENE	0.033	6/bn	0.5	l/gu
B2CEXM	BIS (2-CHLOROETHOXY) METHANE	0.059	6/6n	1.5	l/gn
B2CIPE	BIS (2-CHLOROISOPROPYL) ETHER	0.2	6/6n	5.3	l/bn

W0019338T.080/7

APPENDIX K PROJECT ANALYTE LIST

REMEDIAL INVESTIGATION REPORT DEVENS, MASSACHUSETTS

		lios		WATER	R
TEST NAME	PARAMETER NAME	CPL	UNIT	CPL	UNIT
B2CLEE	BIS (2-CHLOROETHYL) ETHER/ 2,2-OXYBIS(1-CHLOROPROPANE)	0.033	6/6n	1.9	l/ɓn
В2ЕНР	BIS (2-ETHYLHEXYL) PHTHALATE	0.62	6/6n	4.8	l/bn
BAANTR	BENZO [A] ANTHRACENE	0.17	6/6n	1.6	l/gu
BAPYR	BENZO [A] PYRENE	0.25	ug/g	4.7	l/gn
BBFANT	BENZO [B] FLUORANTHENE	0.21	ng/g	5.4	l/gu
BBZP	BUTYLBENZYL PHTHALATE	0.17	g/gn	3.4	l/ɓn
BGHIPY	BENZO [G,H,I] PERYLENE	0.25	g/gn	6.1	l/ɓn
BKFANT	BENZO [K] FLUORANTHENE	0.066	6/6n	0.87	l/bn
BZALC	BENZYL ALCOHOL	0.19	6/6n	0.72	l/gu
CARBAZ	CARBAŻOLE	No certified limit		No certified limit	
CHRY	CHRYSENE	0.12	6/6n	2.4	l/bn
CL6BZ	HEXACHLOROBENZENE	0.033	6/6n	1.6	l/bn
CL6CP	HEXACHLOROCYCLOPNTADIENE	6.2	B∕Bn	8.6	l/bn
CL6ET	HEXACHLOROETHANE	0.15	6/6n	1.5	l/gn
DBAHA	DIBENZ [A,H] ANTHRACENE	0.21	6/6n	6.5	l/bn
DBZFUR	DIBENZOFURAN	0.035	6/6n	1.7	l/gu
DEP	DIETHYL PHTHALATE	0.24	6/6n	2	l/ɓn
DMP	DIMETHYL PHTHALATE	0.17	b/bn	1.5	וומ/ן
W0019338T.080/8					

APPENDIX K PROJECT ANALYTE LIST

REMEDIAL INVESTIGATION REPORT DEVENS, MASSACHUSETTS

		SOIL	7	WATER	ER
TEST NAME	PARAMETER NAME	CRL	UNIT	CHL	UNIT
DNBP	DI-N-BUTYL PHTHALATE	0.061	6/6n	3.7	l/gu
DNOP	DI-N-OCTYL PHTHALATE	0.19	6/bn	15	l/gu
FANT	FLUORANTHENE	0.068	b/bn	3.3	l/gu
FLRENE	FLUORENE	0.033	b/bn	3.7	l/bn
НСВО	HEXACHLOROBUTADIENE	0.23	6/6n	3.4	l/gu
ICDPYR	INDENO [1,2,3-C,D] PYRENE	0.29	6/ɓn	8.6	l/bn
ISOPHR	ISOPHORONE	0.033	g/gn	4.8	l/bn
NAP	NAPHTHALENE	0.037	g/gn	0.5	l/gn
NB	NITROBENZENE	0.045	b/bn	0.5	l/bn
NNDNPA	N-NITROSO DI-N-PROPYLAMINE	0.2	6/6n	4.4	l/bn
NNDPA	N-NITROSO DIPHENYLAMINE	0.19	6/6n		l/bn
PCP	PENTACHLOROPHENOL	1.3	g/gu	18	l/bn
PHANTR	PHENANTHRENE	0.033	6/6n	0.5	l/gu
PHENOL	PHENOL	0.11	6/6n	9.2	l/bn
PYR	PYRENE	0.033	b/bn	2.8	l/bn
PAL ORGANICS PI	PAL ORGANICS PESTICIDES AND PCBS				
АВНС	ALPHA-BENZENEHEXACHLORIDE/ ALPHA-HEXACHLOROCYCLOHEXANE	0.00907	ng/g	0.0385	l/bn
ACLDAN	ALPHA CHLORDANE	0.005	6/6n	0.075	l/bn

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APPENDIX K PROJECT ANALYTE LIST

REMEDIAL INVESTIGATION REPORT DEVENS, MASSACHUSETTS

		TIOS		WATER	
TEST NAME	PARAMETER NAME	CPL	UNIT	CRL	UNIT
AENSLF	ALPHA-ENDOSULFAN/ENDOSULFAN I	0.00602	6/6n	0.023	l/gu
ALDRN	ALDRIN	0.00729	g/gn	0.0918	l/gu
ввнс	BETA-BENZENEHEXACHLORIDE/ BETA-HEXACHLOROCYCLOHEXANE	0.00257	ug/g	0.024	l/ɓn
BENSLF	BETA-ENDOSULFAN/ENDOSULFAN II	0.00663	6/bn	0.023	l/ɓn
рвнс	DELTA-BENZENEHEXACHLORIDE/ DELTA-HEXACHLOROCYCLOHEXANE	0.00555	ng/g	0.0293	l/gu
DLDRN	DIELDRIN	0.00629	b/bn	0.024	l/bn
ENDRN	ENDRIN	0.00657	ng/g	0.0238	l/gu
ENDRNA	ENDRIN ALDEHYDE	0.024	g/gn	0.0285	l/gu
ENDRNK	ENDRIN KETONE	Not certified		Not certified	
ESFS04	ENDOSULFAN SULFATE	0.00763	b/bn	0.0786	l/gu
GCLDAN	GAMA-CHLORDANE	0.005	6/6n	0.075	l/bn
HPCL	HEPTACHLOR	0.00618	6/bn	0.0423	l/bn
HPCLE	HEPTACHLOR EPOXIDE	0.0062	ɓ/ɓn	0.0245	l/bn
ΓΙΝ	LINDANE/GAMMA-BENZENEHEXACHLORIDE/ GAMMA-HEXACHLOROCYCLOHEXANE	0.00638	6/6n	0.0507	l/ɓn
MEXCLR	METHOXYCHLOR	0.0711	6/6n	0.057	l/ɓn
PCB016	PCB 1016	0.0666	6/bn	0.16	l/bn
PCB221	PCB 1221	9990	6/bn	0.16	
W0019338T.080/10					

APPENDIX K PROJECT ANALYTE LIST

REMEDIAL INVESTIGATION REPORT DEVENS, MASSACHUSETTS

		TIOS		WATER	<u> </u>
TEST NAME	PARAMETER NAME	ายว	UNIT	CRL	UNIT
PCB232	PCB 1232	0.0666	6/6n	0.16	l/gu
PCB242	PCB 1242	0.0804	6/6n	0.19	· I/bn
PCB248	PCB 1248	0.0804	6/6n	0.19	l/gu
PCB254	PCB 1254	0.0804	6/6n	0.19	l/bn
PCB260	PCB 1260	0.0804	6/6n	0.19	l/gu
PPDDD	2,2-BIS (PARA-CHLOROPHENYL)- 1,1DICHLOROETHANE	0.00826	ß/ßn	0.0233	l/ɓn
PPDDE	2,2-BIS (PARA-CHLOROPHENYL)- 1,1-DICHLOROETHENE	0.00765	₿/ɓn	0.027	l/ɓn
PPDDT	2,2-BIS (PARA-CHLOROPHENYL)- 1,1,1-TRICHLOROETHANE	0.00707	6/6n	0.034	l/ɓn
TXPHEN	TOXAPHENE	0.444	₫/ɓn	1.35	l/bn

Notes:

Certified Reporting Limit Not Applicable

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Fort Devens FAII Vol. IV Appendix K

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RI Report: Section No.:

Revision No.: 1

Date:

August 1994

APPENDIX K BACKGROUND DATA RATIONALE

RI Report:

Fort Devens FAII Vol. IV

Section No.:

Appendix K

Revision No.: 1

Date:

August 1994

INTRODUCTION

On 10 September 1993, representatives from Ecology and Environment, Inc. (E & E), Arthur D. Little (ADL), ABB Engineering Services (ABB), and the U.S. Army Environmental Center (USAEC) met at ADL's office in Cambridge, MA to discuss methods for determining background concentrations of organic and inorganic analytes in groundwater, soil, sediment, and surface water at Fort Devens. The objective of the meeting was to initiate the development of a uniform set of background values that could be used by all contractors to identify organic and inorganic contamination at the base. This appendix summarizes the current background values being used for this report, incorporating data from all available sources.

Appendix K is divided into three sections based on matrix. The sections are:

- Section K1: Background Concentrations of Inorganic Analytes in Sediment;
- Section K2: Background Concentrations of Inorganic Analytes in Soil and Background Concentrations of Organic Analytes in soil; and
- Section K3: Background Concentrations of Inorganic Analytes in Surface Water.

Background concentration ranges for inorganic analytes in each matrix were determined from designated background samples collected at Fort Devens. The background sediment database was augmented with regional data from the peer-reviewed scientific literature. The background surface-water database was augmented with additional surface-water samples from IRDMIS.

There are no background data for groundwater on a regional scale from areas known to be unaffected by human activity. Wells that are upgradient of specific sites, such as 32M-92-01X at the DRMO Yard, have been compared with on-site wells.

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RI Report:

Fort Devens FAII Vol. IV

Section No.:

Appendix K

Revision No.: 1

Date:

August 1994

SECTION K2

Background Concentrations of Inorganic Analytes in Soil

Background soil samples for inorganic analytes were collected in August 1991, October 1992, and June 1993. Thirty-three samples in all were collected. The samples were collected from all three of the major soil associations on the base and from each of Main Post, North Post, and South Post. Sample locations are shown in Figure K2-1. Note that no AOCs occur on the fourth soil association mapped, which lies outside the present boundaries of the facility. The background soil samples were all collected from sites that were, as far as could be determined visually, undisturbed, that were at least 50 feet from any road and at least 300 feet from any known or suspected Study Area. In most cases the distance was greater, especially in South Post.

Table K2-1 is the background database for inorganic analytes in soil. Sampling date, post, and soil association are listed for the samples. There are two columns in the table for each analyte: one column for the measured concentration and one for notes. The note column indicates which data points were entered as one-half the LOD and which are outliers. For calculation purposes, values that appeared in IRDMIS as less than the LOD were converted to one-half the LOD. Outliers were identified by the method of Dixon or Grubbs as described by Sokal and Rohlf (1981), graphically, or by judgment. Dixon's test is valid for sample sizes of 3 to 25. Grubbs' test was used for sample sizes greater than 25.

Grubbs' method was applied to the data for the following sixteen analytes: aluminum, arsenic, barium, cadmium, calcium, chromium, copper, iron, lead, magnesium, manganese, nickel, potassium, sodium, vanadium, and zinc. Dixon's test for outliers was applied to the data for beryllium, cobalt, and selenium after omitting 10 samples for beryllium, 10 samples for cobalt, and 20 samples for selenium that were reported as less than the LOD, but that had unusually high LODs. For example, 10 samples had a reported cobalt concentration of < 14 mg/kg (see Table K2-1); this LOD is greater than the highest measured value for cobalt of 4.69 mg/kg.

Outliers for mercury were determined graphically. A normal probability plot showed the mercury data to be bimodally distributed; the four values in the upper cluster were judged to be outliers (see Table K2-1). Silver was detected in only two background soil samples; the "detects" were judged to be outliers (see Table K2-1). In all, 35 outliers were identified in the background soil database.

Table K2-2 lists concentration ranges for inorganic analytes for the Fort Devens background soil database, excluding outliers. Inorganic analyte levels in AOC samples were compared with the maximum of the background range; exceedances were considered site-related contamination. For comparison, Table K2-2 also lists concentration ranges for inorganic analytes in uncontaminated soils of the eastern United States. For all analytes, the maximum concentration in the Fort Devens background database lies within the range for the eastern United States, usually toward the low end of the range. This suggests that comparing

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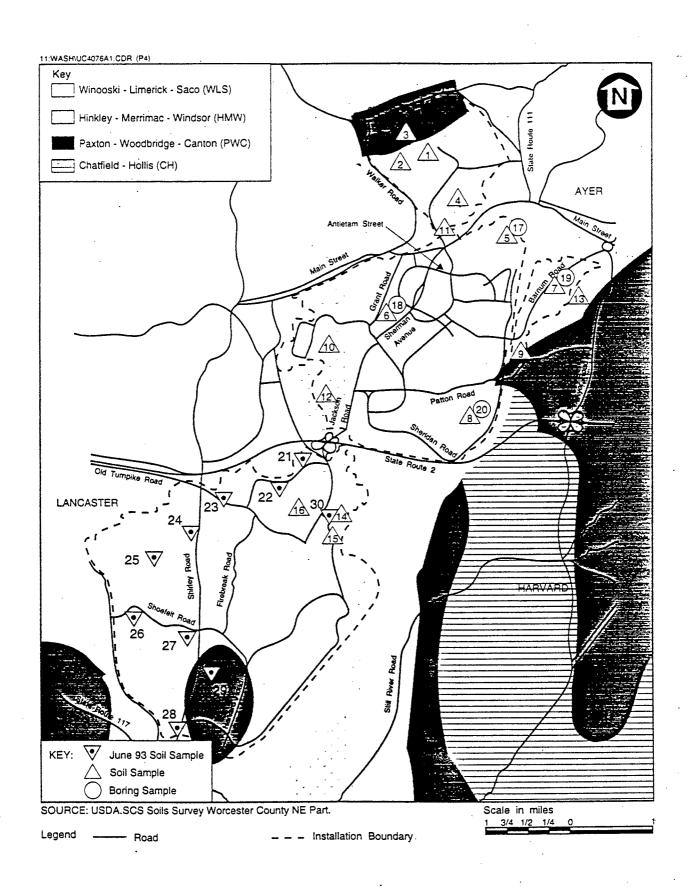


Figure K2-1 BACKGROUND SAMPLING SITES FOR SOIL

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TABLE K2-1. BACKCHOUND DATABASE FOR DYRGANIC ANALTES IN SOIL AT FORT DEVENS. ALL VALLES ARE M9/kg.

1	į	1			1	ł							
3	3	Ç	3		AL ALKOITS	77		AS ASMOILS	BA BANOTES	BE BENOTES		A CNOTES	CR CRICIES
SOIL-01	ALC91 N		¥	AREA	6400	1.71	1/2 100	9.6	14.2	0.119	0.212 1/2 1.00	610	7.11
SOIL-02 A	AUCOI N	NORTH	M.	AREA	14000	17	001 2/1	13	35	0.126	0.212 1/2 1.00	610	11.1
SOIL-03 A	AUG91 N	NORGIH	FFC	MEA	12000	1.1	1/2 100	9.3	14.5	0.039	0.212 1,72 1.00	330	7.57
SOIL-04 A		HIDHON	WES	AREA	8800	1.71	021.2/1	9.4	14.2	. 0.141	0.212 1/2 1.00	010	10.2
SOIL-05 N	NUC91 P	- NIN	HM	AREA	0066	1.1	1,2 too	13	15.5	0.124	0.212 1/2 100	430	8.2
SOIL-06 A	AUCO1 P	- NIA	M.	AREA	13000	1.71	007 2/1	32 CUTLER	11.5 1/2 100	0.108	1.28	710	30.3
SOIL-07 A	ALCO1 P	- NIN	M	MEA	12000	1.71	1,2 1,00	15	36	0.133	1.06	1400 CUTLER	£
SOIL-08 A	AUC91 P	NATA	IM	AVEA	2500 1/2 LOD	1.71	1/2 100	15	15.6	0.142	0.212 1,72,100	310	9.59
30II-09 A	ALC91 P	NIA.	PAC	MEA	24000 CUILIER	17	1,7 too	25 CONTLER	73	0.335	1.06	050 1/2 100	56.5 contaba
SOIL-10	AUG91 P	NIV	MIS	NEA	8500	11	1/2 1000	14	11.5 1/2 100	0.390 1/2 LCD	2.1 1/2 1.00	2100 CUTLIER	19.5 1/2 LOD
SOIL-11 A	AUC91 P	NI'N	MES	NREA	11000	1.71	2/2 100	13	25	0.350	4.48 comman	2800 CUTLIER	27.1
SOIL-12 N	AUC91 P	NIN	WLS	NEA	7400	1.71	1/2 100	7.1	12.9	0.172	0.212 1/2 1.00	810	6.02
SOIL-13 A	ALC91 P	WIN	H.M.	MEA	18000	1.1	1,2 1,00	28 CUTLIER	67.2 COMLER	0.672	3.52 commen	1500 1/2 100	. 33
20TL-14 A	ALC:91	SOUTH	M.CS	AREA	0069	11.71	22 100	11	16.6	0.146	0.212 1/2 1000	740	13.8
SOIL-15 A		SOUTH	MES	AREA	8000	1.1	1/2 100	4.6	16.2	0.145	0.212 1/2 100	144	1.95 1/2 1.00
			PAC	NEA	13000	1.71	007 2/1	11	46	0.533	0.212 1/2 1.00	02.2	12.5
			Æ	BORE	4300	1.71	12 100	9.5	19.6	0.039 1/2 1.00	0.212 1/2 1.00	350	τ.π
			Æ	BONE	11000	1.71	007 2/1	99 CUTLIER	. 29	0.039	0.212 1/2 1.00	059	39.5 OUTLER
	_		¥.	ROTE	7100	1.71	22 120	11	14.2	0.104	0.212 1/2 1.00	017	14.1
201L-20 A	_		Ŧ	3000	0017	1.71	007 2/1	19	31	0.188	0.212 1/2 1.00	810	9.25
			FWC	MEA	7800	0.25	1/2 100	7.03	21.4	0.25 1/2 1.00	0.602	250 1/2 100	7.13
·			FFC	MEA	0096	0.25	1,2 150	7.8	15	0.25 1/2 1.00	0.647	250 1/2 1.00	10.6
			H.A.	APEA .	9800	0.25	1,2 tob	11.0	11.8	0.25 1/2 1.00	0.551	250 1/2 1000	10.4
			Z.	ATEA	7400	0.25	1/2 100	14.4	12.3	0.25 1,2 1.00	1.21	250 1/2 1.00	12.5
			H.	MEA	387	0.25	22	6.04	2.5 1/2 1.00	0.25 1/2 1.00	0.25 1/2 100	250 1/2 1.00	1.0 1/2 1/20
	-		T.	NÆS	1800	0.25	1/2 100	8.31	2.5 1/2 1.00	0.25 1/2 1.00	0.25 1/2 100	250 1,2 1.00	2.67
			M.	MEA	T6T	0.25	22 120	5.19	2.5 1/2 100	0.25 1,2 1.00	0.25 1/2 100	250 1/2 1.00	1.0 1/2 1.00
			K IS	MEA	398	0.25	1/2 1/20	2.06	2.5 1/2 1/20	0.25 1,2 1.00	0.25 1/2 1.00	250 1,72 1.000	1.0 1/2 1/20
			PAC.	AREA	1460	0.25	22 100	8.04	2.5 1/2 1.00	0.25 1,2 1.00	0.25 1/2 100	250 1,72 1.000	1.0 1/2 100
BKS-30			MES	MES	603	0.25	021 Z/1	3.3	2.5 1/2 100	0.25 1/2 1.00	0.25 1/2 1.00	250 1/2 1.00	1.0 1/2 1.00
255-92-12X 0CT92		SOUTH			2920	0.55	22 120	3.17	18	0.25 1/2 1.00	0.35 1/2 1.00	50 1/2 100	2.03 1/2 1.00
255-92-13K	OCT32	SCUTIF			11400	0.55	12 100	7.87	28	0.81	0.35 1/2 100	50 1/2 100	9.43
265-92-10X OCT92	OCT)2 :	HILDOS .			7380	0.55	1,2 top	10.7	30.1	0.698	0.35 1/2 100	50 1/2 100	6.09

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TABLE K2-1. CONTINUED.

SAMP INS	DATES	POSTS	ASSOCS	TYPES	K RRUTES	8	E SENDITES	æ	ACNOTES	2	NANOTES	V WYDTES	ĸ	ZANOTES
50П01	AUC:91	NORTH	HWH	AREA	920	2.88	8 1/2 1.00	0.043	1,2 too	26 1	1/2 100	7.57	16.5	
50II02	AUC91	NORTH	H-M	ANEA	099	2.88	8 1/2 1.00	0.043	1/2 100	58.6		16.6	7.72	
5011-03	AUC91	NORTH	PWC	AREA	. 230	2.88	8 1/2 1/20	0.043	1/2 top		1/2 100	17.9	14.6	
90IL-04	AUG91	NORTH	MES	AREA	314	2.88	8 1/2 1/20	0.043	1,2 100		1/2 100	11.7	13.6	
SOIL-05	AUC91	MALIN	H-M	AREA	470	2.88	8 1/2 1/20	0.043	1/2 100	11.2		7.91	14.7	
30IL-06	AUC91	MALIN	Mai	AREA	1100	2.88	8 1/2 LOD	0.208 0	CUILLER	8.62		32.3	40	1/2 too
50TL-07	ALC:91	MAIN	MMI	AREA	1700	2.88	8 1/2 1/20	0.043	001 2/1	111		23.4	40	1/2 100
30TL-08	AUG91	MAIN	I MAI	AREA	630	2.88		0.043	1/2 100	26 1	1/2 LOD	8.03	13.2	
SOIL-09	AUG91	MALIN	FAC .	AREA	2400	2.88		0.043	001 2/1	85.8		44.3 CUTLER	130 0	130 CUTLER
90II-10	AUC91	MAZIN	WLS	APECA	066	2.88		0.043	027 Z/I	680 CUILLER	TLIER	6.5 1/2 1.00	4	1/2 top
11-110s	NUC91	MAIN	WES	APEA	1100	2.88		0.582 CUILLER	UTLER	123		18.1	40	1/2 (00)
SOIL-12	AUC91	MAJN	MES 1	AREA	009	2.88		0.043	1/2 tap		027 C/1	16.3	17.7	
50IL-13	AUC91	MAIN	MAI	APEA	2200	2.88	8 1/2 100	0.043	1/2 100	231		46.6 CUILLER	40	1/2 100
30IL-14	ALC:91	SCUIII	M.S.	AREA	200	2.88			1/2 top	100		13.8	22.2	
SOIL-15	AUG91	SOUTH	WES	MESA	248	2.88		0.043	1/2 1000		1/2 top	6.19	11.7	
SOIL-16	AUC91	SCUIII		AREA	2400	2.88		0.043	001 Z/1	130		17.5	23.4	
SOIL-17	AUC91	MAIN	_	ronec,	290	2.88		0.043	1/2 100	57.5		6.12	11.2	
SOIL-18	AUC91	MAIN	EW.	EORE	1700	2.88	8 1,7 1,00	0.043	001 Z/1	124		22.8	40	001 Z/1
SOIL-19	AUC91	MALIN	M	DONE	880	2.88	8 1,2 1.00	0.043	1/2 1.00	7.98		9.89	14.2	
SOIL-20	AUC91	MAIN		3)CI	1000	2.88		0.043	1/2 100	93.9		7.2	13.5	
BKS-21	JUN93	SOUTH	FWC ,	AREA	341	0.1	027 2/1	0.1	22 120	100	1/2 too	10.5	43.9	
DKG-22	JUND3	SOUTH		MEA	100 1/2 100	0.1		0.1	1/2 [00	100	1/2 100	11.4	32.3	
	JUN93	SOUTH	I MAI	NEA	100 1/2 1.00	D 0.1	1/2 100	0.1	1/2 100	100	1/2 100	10.5	28.7	
MS-24	JUN93	SCUTH	I MAI	NEA	100 1/2 1.00	0.603	_	0.1	17 100	1001	1/2 1500	28.5	35.2	
IKS-25	JUN93	SCUTH	I MAI	MES	100 1/2 1.00	0.279 O	•	0.1	007 2/1	100	027 77	1.0 1/2 too	3.69	
3KS−26	JUN93	SOUTH		APEA	100 1/2 1.00	0.489	•	0.1	1/2 100	100	027 2/1	1.0 1/2 1.00	5.26	
3KS-27	JUN93	SOUTH	. Mai	AREA	100 1/2 LOD		_	0.1	027 7/1	100	1/2 [50	1.0 1/2 100	5.33	
3KS-28	JUNG3	SOUTH	_	NEA	100 1/2 1.00	D 0.246	10	0.1	1/2 100	-	22 100	1.0 1/2 1.00	3.52	
3KS-29	. EGNDC	SOUTH		WEA	100 1/2 LOD	0.33	_	0.1	1/2 100	100	22 220	3.3	7.8	
3KS-30	JUNG3	SOUTH		AREA	100 1/2 100	0.1	1/2 100	0.1	001 7/1	100	001 2/1	1.0 1/2 1.00	4.87	
255-92-12K OCT92	002792	SOUTH			215 BK	0.601		0.29	007 2/1	208		4.7	4.015	027 2/1
25S-92-13X	CCT92	SOUTH			260 BK	1.2	1.23 OUTLER	0.29	001 7/1	161		13.3	25.3	
X65-92-10X	1 OCT92	SOUTH			143 BU	0.992	R)	0.29	1/2 100	234		19.8	33.3	

				Table K2-3	~		
		PES FORT DI	PESTICIDE CONCENTRATION RANGES DEVENS MAIN POST SITE INVESTIGAT	ONCENTRA IN POST S	VTION RA	PESTICIDE CONCENTRATION RANGES FORT DEVENS MAIN POST SITE INVESTIGATION	
Compounds	Total Samples	Total Detects	Minimum Detect	Maximum Detect	Average	95th Percentile (3)	Approximate Range of Detection Limits (2)
Soils .							
Chlordane	241	-	0.136	0.136	0.136	1	0.04 - 1
p.pDDD	719 (1)	40	0.004	9.9	0.53	2.85	0.003 - 0.27
p.p'-DDE	726 (1)	70	0.003	2.7	0.10	0.76	0.003 - 0.31
p,p'-DDT	(1) 727	148	0.004	5.6	0.25	1.53	0.004 - 0.41
Sediments							
Chlordane	26	0		9		•	0.016 - 1
p.p'-DDD	444	7.7	0.008	6.2	0.39	2.25	0.008 - 2
p,p'-DDE	449	81	0.003	1.3	0.092	0.44	0.004 - 2
p.pDDT	449	50	0.009	15	0.42	4.66	0.004 - 2

^{*} Composite of results from multiple data sets of Level III data for non-entomology shop locations at Main, South, and North Posts, Fort Devens, Massachusetts.

All results in mg/kg (ppm).

- (1) Sample set with higher detection limit of three removed from data set (total of six samples). (2) Only includes detection limits for results reported in database as "LT". (3) 95th percentile formula mean + (2 x standard deviations) for all detected results.

Source: ADL 1993.



Remedial Investigations Report Functional Area II Volume IV of IV Appendices

Fort Devens, Massachusetts

August 1994 Contract No. DAAA15-90-D-0012 Delivery Order No. 0003 ELIN A009

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CALCULATION OF BACKGROUND CONCENTRATIONS

Harding Lawson Associates

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TABLE L-1 AOC 57

REMEDIAL INVESTIGATION REPORT DEVENS, MASSACHUSETTS

	SOIL	GRO	UNDWATER
Analyte	Concentration µg/g	Analyte	Concentration μg/L
Aluminum	18000	Aluminum	6870
Antimony	0.5	Antimony	3.03
Arsenic	19	Arsenic	10.5
Barium	54	Barium	39.6
Beryllium	0.81	Beryllium	5
Cadmium	1.28	Cadmium	4.01
Calcium	810	Calcium	14700
Chromium	33	Chromium	14.7
Cobalt	4.7	Cobalt	25
Copper	13.5	Copper	8.09
Iron	18000	Iron	9100
Lead	48	Lead	4.25
Magnesium	5500	Magnesium	3480
Manganese	380	Manganese	291
Mercury		Mercury	0.243
Nickel	14.6	Nickel	34.3
Potassium	2400	Potassium	2370
Selenium		Selenium	3.02
Silver	0.086	Silver	4.6
Sodium	131	Sodium	10800
Thallium		Thallium	6.99
Vanadium	32.3	Vanadium	11
Zinc	43.9	Zinc	21.1

GROUNDWATER BACKGROUND CONCENTRATIONS REPRESENTATIVE SAMPLES FORT DEVENS, MASSACIIUSETTS

MONITORING WELL	LOCATION	TOTAL SUSPENDED SOLIDS (ug/L)	ALUMINUM (ug/L)
G6M-92-09X	NORTH POST	37,000	230
G6M-92-11X	NORTH POST	53,000	1,920
WWTMW-01	NORTH POST	20,000	2,330
WWTMW-13	NORTH POST	30,000	3,150
WWTMW-14	NORTH POST	25,000	9,130
G3M-92-01X	MAIN POST	<4,000	7.1
13M-92-01X	MAIN POST	ı	7,270
12M-92-01X	SOUTHPOST	ı	179
27M-92-04X	SOUTHPOST	I	8,700
28M-92-01X	SOUTHPOST	ı	2,280

H2ODATAWKI 05-Mw-93

E)ATA	CALCULA	rions
	ALUMINUM		
MONITORING	CONCENTRATION		
WELL	(ug/L)	Minimum -	71
G3M-92-01X	71	7	
12M-92-01X	179	Maximum -	9140
G6M-92-09X	230		2525
G6M-92-11X	1920	Mean -	3527
28M-92-01X	2280 2330	95th %ile -	6874
WWTMW-01 WWTMW-13	3150	93th 76th —	0074
13M-92-01X	7270	Background	
27M-92-04X	8700	Concentration -	6870
WWTMW-14	9140	00200200	
	ANTIMONY		
MONITORING	CONCENTRATION		
WELL	(ug/L)	Minimum -	1.52
WWTMW-14	1.52		
WWTMW-13	1.52	Maximum -	1.52
WWTMW-01	1.52	1/2	1.60
G6M-92-11X G6M-92-09X	1.52 1.52	Mean –	1.52
G3M-92-01X	1.52	95th %ile -	NA
28M-92-01X	1.52)5th /6hc	117
27M-92-04X	1.52	Background	
13M-92-01X	1.52	Concentration -	3.03 *
12M-92-01X	1.52		i
	ARESNIC		
MONITORING	CONCENTRATION	İ	
WELL	(ug/L)	Minimum -	1.27
G6M-92-11X	1.27	Ì	
12M-92-01X	1.27	Maximum -	15.20
G6M-92-09X	1.27	1	<i>5</i>
G3M-92-01X	1.77	Mean –	5.65
28M-92-01X WWTMW-13	3.94 5.39	95th %ile -	10.5
WWTMW-01	9.81	73111 70110	10.0
13M-92-01X	10.9	Background	ļ
WWTMW-14	15.2	Concentration -	10.5
27M-92-04X	32.3 **		
	BARIUM		
MONITORING	CONCENTRATION		
WELL	(ug/L)	Minimum -	2.5
12M-92-01X	2.5	- 	
G6M-92-09X	7.6	Maximum –	52.0
G3M-92-01X	10.7	Mar-	22.6
WWTMW-01	12.4	Mean -	22.6
28M-92-01X	14.4 16.1	95th %ile -	39.6
G6M-92-11X WWTMW-13	19.5)3111 /011E -	.77.0
13M-92-01X	44.5	Background	
WWTMW-14	46.3	Concentration -	39.6
27M-92-04X	52.0		

- Method Detection Limit
- Likely Statistical Outlier

MONITORING WELL G3M-92-01X 12M-92-01X	BERYLLIUM CONCENTRATION (ug/L) 2.50 2.50 2.50 2.50	Minimum –	
WELL G3M-92-01X	(ug/L) 2.50 2.50	Minimum –	
G3M-92-01X	2.50 2.50	Minimum -	
1	2.50	1	2.50
	2 <0	Maximum -	2.50
G6M-92-09X		Mean -	2.50
G6M-92-11X 28M-92-01X	2.50 2.50	Mean -	2.30
WWTMW-01	2.50	95th %ile -	NA
WWTMW-13 13M-92-01X	2.50 2.50	Background	
27M-92-04X	2.50	Concentration -	5.00 *
WWTMW-14	2.50		
	CADMIUM		
MONITORING (CONCENTRATION		
WELL	(ug/L)	Minimum -	2.01
WWTMW-14	2.01	Maximum -	2.01
WWTMW-13 WWTMW-01	2.01 2.01	Maximum -	2.01
G6M-92-11X	2.01	Mean -	2.01
G6M-92-09X	2.01	05.1 07.1	N7.4
G3M-92-01X 28M-92-01X	2.01 2.01	95th %ile -	NA
27M-92-01X	2.01	Background	
13M-92-01X	2.01	Concentration -	4.01 *
12M-92-01X	2.01		
	CALCIUM		
MONITORING	CONCENTRATION		
WELL	(ug/L)	Minimum -	179
12M-92-01X	179		22200
28M-92-01X	1910	Maximum –	23200
WWTMW-14 WWTMW-13	2490 3280	Mean -	7801
G6M-92-11X	5780	Wican	7001
WWTMW-01	6940	95th %ile -	14747
G3M-92-01X	<i>7</i> 710		!
27M-92-04X	8820	Background Concentration -	14700
G6M-92-09X 13M-92-01X	17700 23200	Concentration -	14700
	CHROMIUM		
MONITORING	CONCENTRATION		
WELL	(ug/L)	Minimum -	3.0
G3M-92-01X	3.01		•0 =
G6M-92-09X	3.01	Maximum -	18.7
28M-92-01X	3.01 3.01	Mean -	8.7
12M-92-01X WWTMW-01	3.01 6.04	Wieau -	0.7
G6M-92-11X	6.36	95th %ile -	14.7
WWTMW-13	10.1		
27M-92-04X	16.4	Background	• 4 =
13M-92-01X WWTMW-14	16.9 18.7	Concentration -	14.7

Method Detection Limit

Likely Statistical Outlier

D	ATA	CALCULA	TIONS
	COBALT		
MONITORING	CONCENTRATION		
WELL	(u g/L)	Minimum -	12.5
G3M-92-01X	12.5		
12M-92-01X	12.5	Maximum -	12.5
G6M-92-09X	12.5		
G6M-92-11X	12.5	Mean -	12.5
28M-92-01X	12.5	0541 0732	NTA :
WWTMW-01	12.5 12.5	95th %ile -	NA
WWTMW-13 13M-92-01X	12.5	Background	ļ
27M-92-04X	12.5	Concentration -	25.0 *
WWTMW-14	12.5	Concentiation	20.0
	COPPER		
MONITORING	CONCENTRATION		•
WELL	(ug/L)	Minimum -	4.05
G3M-92-01X	4.05		
WWTMW-14	4.05	Maximum -	6.52
28M-92-01X	4.05		
WWTMW-01	4.05	Mean -	4.36
G6M-92-09X	4.05	95th %ile -	5.2
12M-92-01X G6M-92-11X	4.05 4.05	95th %ne -	3.4
WWTMW-13	6.52	Background	
13M-92-01X	18.60 **	Concentration -	8.09 *
27M-92-04X	19.00 **		
	IRON	•	
MONITORING	CONCENTRATION		
WELL	(ug/L)	Minimum -	171
G3M-92-01X	171		1000
G6M-92-09X	331	Maximum -	12900
12M-92-01X	373	Maan	1611
G6M-92-11X 28M-92-01X	2390 2410	Mean -	4611
WWTMW-01	3250	95th %ile -	9104
WWTMW-13	3830	70	
WWTMW-14	9250	Background	.
27M-92-04X	11200	Concentration -	9100
13M-92-01X	12900		
	LEAD		
MONITORING	CONCENTRATION		1
WELL	(ug/L)	Minimum -	0.65
G6M-92-09X	0.65		
WWTMW-01	2.00	Maximum –	5.70
28M-92-01X	. 2.17	Mean -	2.81
G3M-92-01X	2.30 2.30	ivican -	2.01
G6M-92-11X WWTMW-13	3.10	95th %ile -	4.25
12M-92-01X	4.23	72.2 //	
WWTMW-14	5.70	Background	
13M-92-01X	12.10 **	Concentration -	4.25
27M-92-04X	12.40 ••		· i

- Method Detection Limit
- Likely Statistical Outlier

	DATA	CALCULATIONS
	MAGNESIUM	
MONITORING	CONCENTRATION	
WELL	(ug/L)	Minimum - 693
28M-92-01X	693	
G6M-92-11X	857	Maximum - 4500
G3M-92-01X	1000	<u>.</u>
WWTMW-13	1390	Mean - 2157
G6M-92-09X	1600	05:1 97:1
WWTMW-01	1900	95th %ile - 3477
WWTMW-14	1970 3550	Background
27M-92-04X 12M-92-01X	4110	Concentration - 3480
13M-92-01X	4500	Concentiation
	MANGANESE	
MONITORING	CONCENTRATION	
WELL	(ug/L)	Minimum - 23.40
G6M-92-09X	23.4	·
12M-92-01X	69.9	Maximum - 486.00
WWTMW-01	77.7	1.500
28M-92-01X	86.4	Mean - 156.93
G6M-92-11X	102 107	95th %ile - 290.7
WWTMW-13 13M-92-01X	227	95th %he - 290.7
WWTMW-14	233	Background
G3M-92-01X	486	Concentration - 291
27M-92-04X	1110 **	
	MERCURY	
MONITORING	CONCENTRATION	
WELL	(ug/L)	Minimum - 0.12
WWTMW-01	0.12	
G3M-92-01X	0.12	Maximum - 0.70
12M-92-01X	0.12	14
13M-92-01X	0.12	Mean - 0.18
WWTMW-14	0.12 0.12	95th %ile - 0.35
28M-92-01X G6M-92-11X	0.12	95th 76the - 0.55
G6M-92-09X	0.12	Background
27M-92-04X	0.12	Concentration - 0.243 *
WWTMW-13	0.70	
	NICKEL	
MONITORING	CONCENTRATION	<u> </u>
WELL	(ug/L)	Minimum - 17.20
G6M-92-09X	17.2	
WWTMW-01	17.2	Maximum - 17.20
28M-92-01X	17.2	
G3M-92-01X	17.2	Mean - 17.20
G6M-92-11X	17.2	
WWTMW-13	17.2	95th %ile - NA
12M-92-01X	17.2	De desseus d
WWTMW-14	17.2	Background
13M-92-01X 27M-92-04X	17.2 17.2	Concentration - 34.3 *

- Method Detection Limit
- Likely Statistical Outlier

D	ATA	CALCULA	TIONS
	POTASSIUM		
MONITORING	CONCENTRATION		
WELL	(ug/L)	Minimum -	461
28M-92-01X	461 645	Maximum -	2790
G6M-92-11X WWTMW-13	1080	Maximum -	2/90
G3M-92-01X	1450	Mean -	1644
12M-92-01X	1500	054 077	2270
WWTMW-01 WWTMW-14	1980 1980	95th %ile -	2370
G6M-92-09X	1980	Background	
13M-92-01X	2570	Concentration -	2370
27M-92-04X	2790		
	SELENIUM		
MONITORING	CONCENTRATION		
WELL	(ug/L)	Minimum -	1.51
G6M-92-09X	1.51	16	, , ,
12M-92-01X WWTMW-01	1.51 1.51	Maximum -	1.51
28M-92-01X	1.51	Mean -	1.51
G6M-92-11X	1.51		
WWTMW-13	1.51	95th %ile -	NA
13M-92-01X WWTMW-14	1.51 1.51	Background	
G3M-92-01X	1.51	Concentration -	3.02 *
27M-92-04X	1.51		
	SILVER		
MONITORING	CONCENTRATION		
WELL	(ug/L)	Minimum -	2.30
WWTMW-01	2.30		
G3M-92-01X	2.30	Maximum -	2.30
12M-92-01X 13M-92-01X	2.30 2.30	Mean -	2.30
WWTMW-14	2.30	Wican	2
28M-92-01X	2.30	95th %ile -	NA
G6M-92-11X	2.30	Dooless	
G6M-92-09X 27M-92-04X	2.30 2.30	Background Concentration -	4.60 *
WWTMW-13	2.30	Concentration	4.00
	SODIUM		ļ.
MONITORING	CONCENTRATION		
WELL	(ug/L)	Minimum -	1380
28M-92-01X	1380		10000
G6M-92-09X	2000	Maximum -	18000
WWTMW-14 G6M-92-11X	2100 2430	Mean -	5771
27M-92-04X	3070		-·· -
12M-92-01X	4250	95th %ile –	10841
WWTMW-13	4610	De at	į
G3M-92-01X	8570 11300	Background Concentration -	10800
WWTMW-01 13M-92-01X	18000	Concentration	10000

Method Detection Limit

Likely Statistical Outlier

D	ATA	CALCULA	rions
	THALLIUM		
MONITORING	CONCENTRATION		
WELL	(ug/L)	Minimum -	3.50
28M-92-01X	3.50		
G6M-92-11X	3.50	Maximum -	3.50
WWTMW-13	3.50	16	3.50
G3M-92-01X	3.50 3.50	Mean -	3.30
12M-92-01X WWTMW-01	3.50	95th %ile -	3.50
WWTMW-14	3.50	75th 76hc	320
G6M-92-09X	3.50	Background	
13M-92-01X	3.50	Concentration -	6.99
27M-92-04X	3.50		
	VANADIUM		
MONITORING	CONCENTRATION		
WELL	(ug/L)	Minimum -	5.50
G6M-92-09X	5.50		
12M-92-01X	5.50	Maximum -	14.50
WWTMW-01	5.50	Mann	7.13
28M-92-01X G6M-92-11X	5.50 5.50	Mean -	7.13
WWTMW-13	5.50	95th %ile -	10.41
13M-92-01X	5.50	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	
G3M-92-01X	5.50	Background	į
27M-92-04X	12.8	Concentration -	11.0 *
WWTMW-14	14.5		
	ZINC		
MONITORING	CONCENTRATION		
WELL	(ug/L)	Minimum -	10.6
WWTMW-13	10.6		45.0
G6M-92-09X	10.6	Maximum -	47.0
WWTMW-01	10.6 10.6	Mean -	20.5
28M-92-01X G6M-92-11X	10.6	Mean -	ل.U.ك
G3M-92-01X	10.6	95th %ile -	34.9
WWTMW-14	32.0		
27M-92-04X	41.7	Background	
12M-92-01X	47.0	Concentration -	21.1 *
13M-92-01X	78.5 **	!	

- Method Detection Limit
- ** Likely Statistical Outlier

FIELD ANALYTICAL DATA AND OFF-SITE ANALYTICAL LABORATORY DATA

(Computer Diskette).

HUMAN HEALTH RISK ASSESSMENT

- N-1 RISK CHARACTERIZATION FOR AREA 1
- N-2 CALCULATION OF EPH/VPH EXPOSURE POINT CONCENTRATIONS
- N-3 SOIL ADHERENCE FACTOR CALCULATIONS
- N-4 TOXICITY PROFILES
- N-5 RISK CALCULATIONS
- N-6 RISK SUMMARY TABLES

N-1 RISK CHARACTERIZATION FOR AREA 1

Risk Characterization for AOC 57 Area 1

Area 1 was investigated and addressed as part of the Area Requiring Environmental Evaluation (AREE) 70 investigation (ADL, 1995). This area underwent a soil removal action to address total petroleum hydrocarbon (TPHC) and polynuclear aromatic hydrocarbon (PAH) contamination from parking lot runoff. Although some residual TPHC and PAH concentrations remained in Area 1 soils after the removal action, the contamination was determined to be consistent with soil and sediment at stormwater outfall sediments throughout Devens. Therefore, Area 1 was recommended for no further action (Weston, 1998); the decision is to be formalized in the AOC 57 Record of Decision. However, in accordance with recent USEPA requirements for site closure, a no further action decision must be supported by the demonstration that a site does not pose an unacceptable risk for future unrestricted land use. The assessment of risks associated with unrestricted future land use at Area 1 is presented in this appendix; the assessment indicates that residual contamination at Area 1 does not pose an unacceptable risk for future unrestricted land use.

Methods

Consistent with USEPA guidance for evaluating unrestricted land use, risks were characterized for child and adult residents who are assumed to live at Area 1 in the future. Exposures to soil via incidental ingestion, dermal uptake, and particulate inhalation were evaluated. Exposures were quantified using the residential exposure scenarios described in Section 9.1.3. The exposure point concentrations used to quantify potential soil exposures at Area 1 are the maximum detected concentrations measured in the confirmatory soil samples (post-removal conditions) collected at Area 1. Tables 1 through 4 present the exposure parameters, intake equations, exposure point concentrations, and intake estimates.

Dose-response values were obtained from USEPA sources, as described in Section 9.1.4. The oral RfD for pyrene, and the inhalation RfD for naphthalene, were used as surrogate dose-response values for PAHs with no published values. Toxicity associated with petroleum compounds (e.g., EPH and VPH) was evaluated using dose-response values published the MADEP.

Results

As shown in the table below, the total resident cancer risk does not exceed the USEPA target cancer risk range of $1x10^{-6}$ to $1x10^{-4}$. The non-cancer hazard index values are below the USEPA threshold HI of 1. These results indicate that residual contamination at Area 1 does not pose a risk above USEPA risk limits for the unrestricted future land use.

Exposure pathway	Excess lifetime cancer risk	Hazard index
Adult		
Incidental ingestion	2E-05	0.002
Dermal contact	8E-06	0.001
Dust inhalation	2E-10	0.000002
Total	3E-05	0.003
Child		
Incidental ingestion	3E-05	0.02
Dermal contact	4E-05	0.02
Dust inhalation	1E-10	0.000001
Total	7E-05	0.04
Total Resident Risk	1E-04	Not additive

TABLE 1

INCIDENTAL INGESTION OF AND DERMAL CONTACT WITH SURFACE SOIL - RME UNRESTRICTED LAND USE - ADULT RESIDENT AOC 57 AREA 1 FORT DEVENS, MA

August 1992

13-Oct-99

EXPOSURE PARAMETERS

EQUATIONS

CONCENTRATION SOIL	CS	See Below*	mg/kg	CANCER RISK = INTAKE (mg/kg	CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR (mg/kg-day)-1	
INGESTION RATE	R	100	mg/day			
FRACTION INGESTED	H	4001		HAZARD QUOTIENT = INTAKE	HAZARD QUOTIENT = INTAKE (mg/kg-day) / REFERENCE DOSE (mg/kg-day)	
SOIL ADHERENCE FACTOR	SAF	800	mg/cm²			
SURFACE AREA EXPOSED	SA	5,800	cm²	INTAKE = (INTAKE-INGESTION) + (INTAKE-DERMAL)	N) + (INTAKE-DERMAL)	
CONVERSION FACTOR	£,	0.000001	kg/mg			
BODY WEIGHT	BW	70	kg	INTAKE-INGESTION =	CS x IR x FI x CF x EF x ED	
EXPOSURE FREQUENCY	EF	150	days/year		BW x AT x 365 days/yr	
EXPOSURE DURATION	ED	24	years			
AVERAGING TIME				INTAKE-DERMAL = CS x	CS x SA x SAF x AE x CF x EF x ED	
CANCER	AT	70	years		BW x AT x 365 days/yr	
NONCANCER	AT	24	years			
DERMAL ABSORPTION	AE	Chemical-specific	unitless			
EFFICIENCY						
Notes:						
For noncarcinogenic effects: AT = ED						
The dermal absorption efficiency is from the Risk Assessment Guidance for Superfund Volume I:	isk Assessment Guidance	for Superfund Volume I:				
Human Health Evaluation Manual Supplemental Guidance Dermal Risk Assessment, 1998.	al Guidance Dermal Risk	Assessment, 1998.				
*The lesser of the 95 % upper confidence limit (UCL) & maximum concentration.	(UCL) & maximum conc	entration.				
ND = Value not determined	VE = Poute not evaluated					

TABLE I INCIDENTAL INCESTION OF AND DERMAL CONTACT WITH SURFACE SOIL - RME UNRESTRICTED LAND USE - ADULT RESIDENT

AOC 57 AREA 1 FORT DEVENS, MA

CARCINOGENIC EFFECTS

4.7 9.5E-07 0.13 5.7E-07 7.3E-01 8.2E-01 6.9E-07 4.7E-07 1.2E-06 6.06%

NONCARCINOGENIC EFFECTS

	SOIL	INTAKE	DERMAL	INTAKE	REFERENCE DOSE	CE DOSE	HAZARD	HAZARD	TOTAL	PERCENT
COMPOUND	CONCENTRATION (mg/kg)	INGESTION (mg/kg-day)	ABSORPTION EFFICIENCY	DERMAL (mg/kg-day)	ORAL (vig/kg-day)	DERMAL (mg/kg-day)	QUOTIENT INGESTION	QUOTIENT DERMAL	HAZARD QUOTIENT	TOTAL
Acenaphthene	5.42	3.2E-06	0.13	1.9E-06	2.0E-02	1.8E-02	1.6E-04	1.1E-04	2.7E-04	
Benzo(g,h.I)perylene	4.4	2.6E-06	0.13	1.55817E-06	3.0E-02	2.7E-02	8.6E-05	5.8E-05	1.4E-04	
Fluoranthene	14	8.2E-06	0.13	5.0E-06	4.0E-02	3.6E-02	2.1E-04	1.4E-04	3.4E-04	
Phenanthrene	8.2	4.8E-06	0.13	2.9E-06	3.0E-02	2.7E-02	1.6E-04	1.1E-04	2.7E-04	
Рутепе	Ξ	6.5E-06	0.13	3.9E-06	3.0E-02	2.7E-02	2.2E-04	1.5E-04	3.6E-04	
Benzo(a)anthracene	5.1	3.0E-06	0.13	1.8E-06	3.06-02	2.7E-02	1.0E-04	6.8E-05	1.7E-04	
Benzo(a)pyrene	6.1	3.6E-06	0.13	2.2E-06	3.0E-02	2.7E-02	1.2E-04	8.1E-05	2.0E-04	
Benzo(b)fluoranthene	6.1	3.6E-06	0.13	2.2E-06	3.0E-02	2.7E-02	1.2E-04	8.1E-05	2.0E-04	
Benzo(k)fluoranthene	5.8	3.4E-06	0.13	2.1E-06	3,0E-02	2.7E-02	1.1E-04	7.7E-05	1.9E-04	
Chrysene	6.9	4.1E-06	0.13	2.4E-06	3.0E-02	2.7E-02	1.4E-04	9.2E-05	2.3E-04	
Indeno(1,2,3-cd)pyrene	4.7	2.8E-06	0.13	1.7E-06	3.0E-02	2.7E-02	9.2E-05	6.2E-05	1.5E-04	
C9-C12 Aliphatics	2.41	1.4E-06	0.17	1.16-06	6.0E-01	5.5E-01	2.4E-06	2.0E-06	4.4E-06	
C9-C10 Aromatics	0.386	2.3E-07	0.17	1.8E-07	3.0E-02	2.7E-02	7.6E-06	6.6E-06	1.4E-05	
C9-C18 Aliphatics	10	90-30'9	0.17	4.7E-06	6.0E-01	5.5E-01	1.0E-05	8.6E-06	1.9E-05	
C5-C8 Aliphatics	01	5.9E-06	0.17	4.7E-06	6.0E-02	5.5E-01	9.9E-05	8.5E-06	1.1E-04	

TABLE 2
INHLATION OF PARTICULATES FROM SURFACE SOIL.
UNRESTRICTED LAND USE - CHILD RESIDENT
AOC 57 AREA 1
FORT DEVENS, MA

EXPOSURE PARAMETERS

EQUATIONS

PARAMETER	SYMBOL	VACUE	ONTE	
CONCENTRATION SOIL*	CS	See below	mg/kg	CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR (mg/kg-day)-1
CONCENTRATION AIR PARTICULATES	CAp	Calculated	mg/m³	
CONCENTRATION AIR VOLATILES	CAv	Calculated	mg/m³	HAZARD QUOTIENT = INTAKE (mg/kg-day) / REFERENCE CONCENTRATION (mg/kg-day)
VOLATILIZATION FACTOR**	VF	Calculated	m³/kg	
PARTICULATE EMISSIONS FACTOR	PEF	1.32E+09	ug/m³	
INHALATION RATE	IhR	0.31	m³/hour	INTAKE - INHALATION = (CAp + Cav) x RAF x IhR x ET x EF x ED
BODY WEIGHT	BW	15	kg	BW x AT x 365 days/yr
EXPOSURE TIME	ET	8	hours/day	
EXPOSURE FREQUENCY	댐	150	days/year	
EXPOSURE DURATION	ED	9	years	AIR CONCENTRATION PARTICULATES = CS x 1/PEF
RELATIVE ABSORPTION FACTOR	RAF	100%		
AVERAGING TIME				AIR CONCENTRATION VOLATILES = CS x I/VF
CANCER	AT	07	years	(VF not calculated because there are no VOCs selected as CPCs).
NONCANCER	AT	24	years	
Notes: * Soil concentration used is the lesser of the 95 % upper confidence limit (UCL) & maximum concentration	er confidence limit (UCL) &	maximum concentratio	ę.	
**Volatilization factor used only for volatile chemicals of potential concern.	ntial concern.			
For noncarcinogenic effects: AT = ED				
ND = Value not determined				

TABLE 2
INHLATION OF PARTICULATES FROM SURFACE SOIL
UNRESTRICTED LAND USE - CHILD RESIDENT
AOC 57 AREA 1
FORT DEVENS, MA

CARCINOGENIC EFFECTS

	18.10	CANCER RISK	SIMMARY					
6.06%	6.4E-12	3.1E-01	2.1E-11	3.6E-09		AN A	4.7	Indeno(1,2,3-cd)pyrene
%60.0	9.4E-14	3.1E-03	3.0E-11	5.2E-09		Y.	6.9	Chrysene
0.75%	7.9E-13	3.1E-02	2.6E-11	4.4E-09		Ϋ́	5.8	Benzo(k)fluoranthene
7.87%	8.3E-12	3.1E-01	2.7E-11	4.6E-09		A'N	6.1	Benzo(b)fluoranthene
78.66%	8.3E-11	3.1E+00	2.7E-11	4.6E-09		NA NA	6.1	Benzo(a)pyrene
	7.0E-12	3.1E-01	2.3E-11	3.9E-09		A'N	5.1	Benzo(a)anthracene
	CANCER	FACTOR (mg/kg-day)-1	INTAKE (tag/kg-day)	PARTICULATES (mg/m')	VOLATILES (mg/m²)	VF (m.7/kg)	CONCENTRATION (mg/kg)	COMPOUND
PERCENT		ANCER SLOPE		KTRATION	AIR CONCEY		TIOS	

NONCARCINOGENIC EFFECTS

	(mg/kg)	(m²/kg)	(m/sm)	(mg/m)	(mg/kg-day)	DOSE (mg/kg-dry)	HAZAKD QUOTIENT	TOTAL RISK
Acenaphthene	5.42	ΥN		4.1E-09	7.0E-11	8.6E-04	8.1E-08	96.9
Benzo(g,h,l)perylene	4.4	AN	***	3.3E-09	5.7E-11	8.6E-04	6.6E-08	8:65%
Fluoranthene	14	ΥN		1.1E-08	1.8E-10	8.6E-04	2.1E-07	17.99%
Phenanthrene	8.2	ζZ		6.2E-09	1.1E-10	8.6E-04	1.2E-07	10.54%
Рутепе	Ξ	Ϋ́Z		8.3E-09	1.4E-10	8.6E-04	1.6E-07	14.13%
Benzo(a)anthracene	5.1	Ϋ́Z		3.9E-09	6.6E-111	8.6E-04	7.6E-08	6.55%
Вепzo(а)рутепе	6.1	AN		4.6E-09	7.8E-11	8.6E-04	9.1E-08	7.84%
Benzo(b)fluoranthene	6.1	Y'X		4.6E-09	7.8E-11	8.6E-04	9.1E-08	7.84%
Benzo(k)fluoranthene	5.8	VX		4.4E-09	7.SE-111	8.6E-04	8.7E-08	7.45%
Chrysene	6.9	ΥX		5.2E-09	8.9E-11	8.6E-04	1.0E-07	8.87%
Indeno(1,2,3-cd)pyrene	4.7	Y Z		3.6E-09	6.0E-11	8.6E-04	7.0E-08	6.04%
VPH								
C9-C12 Aliphatics	2.41	Y Y		1.8E-09	3.1E-11	5.7E-01	5.4E-11	0.00467%
C9-C10 Aromatics	0.386	NA VA		2.9E-10	5.0E-12	1.7E-02	2.9E-10	0.0251%
C5-C8 Aliphatics	5.77	YZ.		4.4E-09	7.4E-11	5.7E-02	1.3E-09	0.11%
EPH								
C9-C18 Aliphatics	2.5	Y Z		1.9E-09	3.2E-11	5.7E-01	5.6E-11	0.0048%
								

TABLE 2
INHLATION OF PARTICULATES FROM SURFACE SOIL
UNRESTRICTED LAND USE - ADULT RESIDENT
AOC 57 AREA 1
FORT DEVENS, MA

EXPOSURE PARAMETERS

EQUATIONS

PARAMETER	SYMBOL	VALUE	UNITS	
CONCENTRATION SOIL*	cs	See below	mg/kg	CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR (mg/kg-day)-1
CONCENTRATION AIR PARTICULATES	САр	Calculated	mg/m³	
CONCENTRATION AIR VOLATILES	CAv	Calculated	mg/m³	HAZARD QUOTIENT = INTAKE (mg/kg-day) / REFERENCE CONCENTRATION (mg/kg-day)
VOLATILIZATION FACTOR**	VF	Calculated	m³/kg	
PARTICULATE EMISSIONS FACTOR	PEF	1.32E+09	ng/m³	
INHALATION RATE	IhR	0.63	m³/hour	INTAKE - INHALATION = $(Cap + Cav) \times RAF \times IhR \times ET \times EF \times ED$
BODY WEIGHT	BW	02	kg	BW x AT x 365 days/yr
EXPOSURE TIME	ET	8	hours/day	
EXPOSURE FREQUENCY	EF	150	days/year	
EXPOSURE DURATION	Œ	24	years	AIR CONCENTRATION PARTICULATES = CS x 1/PEF
RELATIVE ABSORPTION FACTOR	RAF	%001		
AVERAGING TIME				AIR CONCENTRATION VOLATILES = CS x 1/VF
CANCER	AT	70	years	(VF not calculated because there are no VOCs selected as CPCs).
NONCANCER	AT	24	years	
Notes: * Soil concentration used is the lesser of the 95 % upper confidence limit (UCL) & maximum concentration	er confidence limit (UCL) &	maximum concentration	Ľ,	
**Volatilization factor used only for volatile chemicals of potential concern.	ntial concern.			
For noncarcinogenic effects: AT = ED				
ND = Value not determined				

TABLE 2
INHLATION OF PARTICULATES FROM SURFACE SOIL
UNRESTRICTED LAND USE - ADULT RESIDENT
AOC 57 AREA 1
FORT DEVENS, MA

CARCINOGENIC EFFECTS

thracene 5.1 NA 3.9E-09 3.9E-11 3.1E-01 rene 6.1 NA 4.6E-09 4.7E-11 3.1E-00 oranthene 5.8 NA 4.4E-09 4.7E-11 3.1E-01 oranthene 5.8 NA 4.4E-09 4.5E-11 3.1E-01 5.2E-09 5.2E-09 5.3E-11 3.1E-01 3.cd)pyrene A.7 NA 3.6E-09 3.6E-11 3.1E-01	COMPOUND	SOIL CONCENTRATION (mg/kg)	VF (m ² /kg)	AIR CONCEN VOLATILES (mg/m²)	TIRATION PARTICULATES (mg/m)	INTAKE (mg/kg-day)	CANCER SLOPE FACTOR (mg/kg-day)+1	CANCER	PERCENT TOFAL RISK
rene 6.1 NA 4.6E-09 4.7E-11 3.1E+00 1.5E-10 oranthene 6.1 NA 4.6E-09 4.7E-11 3.1E-01 1.5E-11 oranthene 5.8 NA 4.4E-09 4.5E-11 3.1E-02 1.4E-12 5.2E-09 5.2E-09 5.3E-11 3.1E-03 1.6E-13 5.cd)pyrene 4.7 NA 3.6E-09 3.6E-11 1.1E-11	Benzo(a)anthracene	5.1	NA		3.9E-09	3.9E-11	3.1E-01	1.2E-11	6.58%
oranthene 6.1 NA 4.6E-09 4.7E-11 3.1E-01 1.5E-11 oranthene 5.8 NA 4.4E-09 4.5E-11 3.1E-02 1.4E-12 5.2E-09 5.2E-09 5.3E-11 3.1E-03 1.6E-13 3.cd)pyrene 4.7 NA 3.6E-09 3.6E-11 3.1E-01 1.1E-11	Benzo(a)pyrene	6.1			4.6E-09	4.7E-11	3.1E+00	1.5E-10	78.66%
oranthene 5.8 NA 4.4E-09 4.5E-11 3.1E-02 1.4E-12 6.9 NA 5.2E-09 5.3E-11 3.1E-03 1.6E-13 3-cd)pyrene 4.7 NA 3.6E-09 3.6E-11 3.1E-01 1.1E-11	Benzo(b)fluoranthene	6.1	AN		4.6E-09	4.7E-11	3.1E-01	1.5E-11	7.87%
6.9 NA 5.2E-09 5.3E-11 3.1E-03 1.6E-13 3-cd)pyrene 4.7 NA 3.6E-09 3.6E-11 3.1E-01 1.1E-11	Benzo(k)fluoranthene	5.8			4.4E-09	4.5E-11	3.1E-02	1.4E-12	0.75%
4.7 NA 3.6E-09 3.6E-11 3.1E-01 1.1E-11	Chrysene	6.9			5.2E-09	5.3E-11	3.1E-03	1.6E-13	0.09%
	Indeno(1,2,3-cd)pyrene	4.7	Υ Υ		3.6E-09	3.6E-11	3.1E-01	1.1E-111	%90.9

NONCARCINOGENIC EFFECTS

			AIR CONCENTRATION		KEFERENCE		PERCEN
COMPOUND	CONCENTRATION (mg/kg)	VF (m²/kg)	VOLATILES PARTICULATES (mg/m²)	INTAKE (mg/kg-day)	DOSE (mg/kg-dky)	HAZARD	TOTAL
cenaphthene	5.42	NA		1.2E-10	8.6E-04	1.4E-07	6.96%
Benzo(g,h,I)perylene	4.4	ΥN	3.3E-09	9.9E-11	8.6E-04	1.1E-07	5.65%
Fluoranthene	14	NA	1.1E-08	3.1E-10	8.6E-04	3.6E-07	17.99%
Phenanthrene	8.2	NA NA	6.2E-09	1.8E-10	8.6E-04	2.1E-07	10.54%
Pyrene	=	Ϋ́	8.3E-09	2.5E-10	8.6E-04	2.9E-07	14.13%
Benzo(a)anthracene	5.1	NA	3.9E-09	1.1E-10	8.6E-04	1.3E-07	6.55%
Benzo(a)pyrene	6.1	ΥN	4.6E-09	1.4E-10	8.6E-04	1.6E-07	7.84%
lenzo(b)fluoranthene	6.1	Ϋ́Z	4.6E-09	1.4E-10	8.6E-04	1.6E-07	7.84%
Benzo(k)fluoranthene	5.8	Y.	4.4E-09	1.3E-10	8.6E-04	1.5E-07	7.45%
Chrysene	6.9	YZ Y	5.2E-09	1.5E-10	8.6E-04	1.8E-07	8.87%
Indeno(1,2,3-cd)pyrene	4.7	A'N	3.6E-09	1.1E-10	8.6E-04	1.2E-07	6.04%
VPH							
C9-C12 Aliphatics	2.41	Ϋ́Z	1.8E-09	5.4E-11	5.7E-01	9.5E-11	0.00467%
C9-C10 Aromatics	0.386	Ϋ́Z	2.9E-10	8.7E-12	1.7E-02	5.1E-10	0.0251%
C5-C8 Aliphatics	5.77	NA	4.4E-09	1.3E-10	S.7E-02	2.3E-09	0.11%
ЕРН							
C9-C18 Aliphatics	2.5	AZ.	1.9E-09	5.6E-11	5.7E-01	9.8E-11	0.0048%

INCIDENTAL INGESTION OF AND DERMAL CONTACT WITH SURFACE SOIL - RME UNRESTRICTED LAND USE - CHILD RESIDENT (1 TO 6 YEARS)
AOC 57 AREA 1
FORT DEVENS, MA

13-Oct-99

August 1992

EXPOSURE PARAMETERS

EQUATIONS

PAKAMETEK	STINEDOL	YALCIN				
CONCENTRATION SOIL	CS	See Below*	mg/kg	CANCER RISK = INTAK	CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR (mg/kg-day)-1	
INGESTION RATE	R	200	mg/day			
FRACTION INGESTED	Œ	100%		HAZARD QUOTIENT = II	HAZARD QUOTIENT = INTAKE (mg/kg-day) / REFERENCE DOSE (mg/kg-day)	
SOIL ADHERENCE FACTOR	SAF		mg/cm²			
SURFACE AREA EXPOSED	SA	2,045	cm²	INTAKE = (INTAKE-ING	INTAKE = (INTAKE-INGESTION) + (INTAKE-DERMAL)	
CONVERSION FACTOR	CF.	10000000	kg/mg			
BODY WEIGHT	BW	15	kg	INTAKE-INGESTION =	CS x IR x FI x CF x EF x ED	
EXPOSURE FREQUENCY	EF	150	days/year		BW x AT x 365 days/yr	
EXPOSURE DURATION	Œ	9	years			
AVERAGING TIME				INTAKE-DERMAL ==	CS x SA x SAF x AE x CF x EF x ED	
CANCER	AT	02	years		BW x AT x 365 days/yr	
NONCANCER	AT	9	years			
DERMAL ABSORPTION	AE	Chemical-specific	unitless			
EFFICIENCY						
Notes:						
For noncarcinogenic effects: AT = ED						
The dernal absorption efficiency is from the Risk Assessment Guidance for Superfund Volume I:	isk Assessment Guidance	for Superfund Volume I:				
Human Health Evaluation Manual Supplemental Guidance Dermal Risk Assessment, 1998.	al Guidance Dermal Risk	Assessment, 1998.				
*The lesser of the 95 % upper confidence limit (UCL) & maximum concentration.	(UCL) & maximum cond	centration.				_
NO = Value not determined	NF = Route not evaluated					

AOC 57 AREA 1 FORT DEVENS, MA

CARCINOGENIC EFFECTS

TOTAL PERCENT CANCER TOTAL RISK RISK	90	5.2E-05 78.66%			5.9E-08 0.09%		1 90 00
CANCER RISK DERMAL	2.6E-06	3.1E-05	3.1E-06	3.0E-07	3.5E-08	2.4E-06	1 90 37
CANCER RISK INGESTION	1.7E-06	2.1E-05	2.1E-06	2.0E-07	2.4E-08	1.6E-06	15 n. 3.1
PE FACTOR DERMAL (uig/kg-day)-1	8.2E-01	8.2E÷00	8.2E-01	8.2E-02	8.2E-03	8.2E-01	Note brek
CANCER SLOF ORAL (mg/kg-day)-1	7.3E-01	7.3E+00	7.3E-01	7.3E-02	7.3E-03	7.3E-01	INMARY CAN
INTAKE DERMAL (mg/kg-day)	3.2E-06	3.8E-06	3.8E-06	3.6E-06	4.3E-06	2.9E-06	9
DERMAL ABSORPTION EFFICIENCY	0.13	0.13	0.13	0.13	0.13	0.13	
INTAKE INGESTION (mg/kg-day)	2.4E-06	2.9E-06	2.9E-06	2.7E-06	3.2E-06	2.2E-06	
SOIL CONCENTRATION (mg/kg)	5.1	6.1	6.1	5.8	6.9	4.7	
COMPOUND	3enzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(k)fluoranthene	Chrysene	ndeno(1,2,3-cd)pyrene	

NONCARCINOGENIC EFFECTS

CNIDOMOG	SOIL	NOTAKE NOTESTON	DERMAL	INTAKE	REFERENCE DOSE	CEDOSE	HAZARD	HAZARD	TOTAL	PERCENT
	(mg/kg)	(mg/kg-day)	EFFICIENCY	(mg/kg-day)	(ing/kg-day)	(mg/kg-day)	ENGESTION	DERMAL	QUOTIENT	RISK
Acenaphthene	5.42	3.0E-05	0.13	3.9E-05	2.0E-02	1.8E-02	1.5E-03	2.2E-03	3.7E-03	10.10%
Benzo(g,h,l)perylene	4.4	2.4E-05	0.13	3.2E-05	3.0E-02	2.7E-02	8.0E-04	1.2E-03	2.0E-03	5.46%
Fluoranthene	41	7.7E-05	0.13	1.0E-04	4.0E-02	3.6E-02	1.9E-03	2.9E-03	4.8E-03	13.04%
Phenanthrene	8.2	4.5E-05	0.13	6.0E-05	3.0E-02	2.7E-02	1.5E-03	2.2E-03	3.7E-03	10.18%
Pyrene	Ξ	6.0E-05	0.13	8.0E-05	3.0E-02	2.7E-02	2.0E-03	3.0E-03	5.0E-03	13.66%
Benzo(a)anthracene	5.1	2.8E-05	0.13	3.7E-05	3.0E-02	2.7E-02	9.3E-04	1.4E-03	2.3E-03	6.33%
Benzo(a)pyrene	6.1	3.3E-05	0.13	4.4E-05	3.0E-02	2.7E-02	1.1E-03	1.7E-03	2.8E-03	7.58%
Benzo(b)fluoranthene	1.9	3.3E-05	0.13	4.4E-05	3.0E-02	2.7E-02	1.1E-03	1.7E-03	2.8E-03	7.58%
Benzo(k)fluoranthene	5.8	3.2E-05	0.13	4.2E-05	3.0E-02	2.7E-02	1.1E-03	1.6E-03	2.6E-03	7.20%
Chrysene	6'9	3.8E-05	0.13	5.0E-05	3.0E-02	2.7E-02	1.3E-03	1.9E-03	3.1E-03	8.57%
Indeno(1,2,3-cd)pyrene	4.7	2.6E-05	0.13	3.4E-05	3.0E-02	2.7E-02	8.6E-04	1.3E-03	2.1E-03	5.84%
C9-C12 Aliphatics	2.41	1.3E-05	0.17	2.3E-05	6.0E-01	5.5E-01	2.2E-05	4.2E-05	6.4E-05	0.17%
C9-C10 Aromatics	0.386	2.1E-06	0.17	3.7E-06	3.0E-02	2.7E-02	7.1E-05	1.4E-04	2.1E-04	0.56%
C9-C18 Aliphatics	10	5.6E-05	0.17	9.7E-05	6.0E-01	5.5E-01	9.3E-05	1.8E-04	2.7E-04	0.74%
C5-C8 Aliphatics	10	5.5E-05	0.17	9.6E-05	6.0E-02	5.5E-01	9.2E-04	1.7E-04	1.1E-03	2.99%

N-2 CALCULATION OF EPH/VPH EXPOSURE POINT CONCENTRATIONS

Calculation of EPH and VPH Exposure Point Concentrations

Exposures to petroleum contamination in soil were evaluated using EPH and VPH data, as opposed to TPHC data. Use of EPH and VPH data permits a site-specific assessment of the petroleum-related constituents, and is consistent with the MADEP petroleum policy (MADEP, 1997). Because some soil samples collected near soil source areas during the 1995/1996 field program were analyzed for TPHC (the EPH/VPH methodology had not been promulgated at the time), it was necessary to convert the TPHC concentrations to EPH/VPH concentrations for development of exposure point concentrations (EPCs). The TPHC data were converted to EPH/VPH by calculating the average composition of EPH/VPH in site soils (based on measured EPH/VPH concentrations), and then applying the compositional information to the measured TPHC concentrations. Statistical parameters for deriving EPCs were then calculated using data sets composed of the measured and estimated EPH/VPH concentrations. This appendix provides documentation of the EPH/VPH EPC calculations.

The calculation of EPCs for EPH and VPH hydrocarbon fractions was performed in a three-step process:

- 1) Petroleum hydrocarbons analytical data for samples used in the risk assessment were grouped by site area (i.e., Area 2 and Area 3), exposure area (i.e., upland and wetland), and exposure medium (i.e., surface soil and subsurface soil). Tables 1 through 8 present the available TPH, EPH, and VPH data. These data summaries were used to identify samples for which only TPH data were available (i.e., samples for which no EPH or VPH analyses were performed).
- 2) The petroleum composition of each sample for which EPH/VPH data were available was identified by calculating the percent composition of each EPH and VPH carbon chain as a fraction of the total EPH/VPH concentration. Tables 9 and 10 show the compositional data for soils at Areas 2 and 3, respectively (shaded values in tables). One-half the sample quantitation limit was used to represent the hydrocarbon fraction concentration for results reported as not-detected. To increase the available data base of directly measured EPH/VPH data, data for surface and subsurface soil samples, as well as upland and wetland soil samples, were combined for each area. Because the same source of petroleum contamination affected soils at each of the areas, combining soil data from surface and subsurface soils and upland and wetland areas within each area should not bias the results.
- 3) The average percent-composition of each EPH and VPH fraction was calculated (Tables 9 and 10). The average percent composition (and range of percent composition for detected concentrations) for each EPH/VPH fraction at Areas 2 and 3 is presented below. As shown, the average percent compositions indicate that the petroleum contamination is primarily associated with heavy-end EPH fractions (e.g., C19-C36 aliphatic EPH). The narrow range of percent compositions indicates that the petroleum composition among the samples at each area is similar. Although a wide range of percent compositions is evident in the VPH fractions at Area 3, the detected EPH and VPH concentrations for the samples with elevated VPH composition was low (e.g., less than 100 mg/kg).

Detected 3% (1.4% - 50%)
3% (1.4% - 50%)
3% (0.2% - 36%)
% (1.8% - 9.7%)
6% (64% - 89%)
2% (9.5% - 13%)
(

4) The petroleum compositional information calculated in Step 2 was used to calculate EPH and VPH equivalent concentrations in samples for which only TPH data was available. EPH/VPH equivalent concentrations were calculated by multiplying the measured TPH concentrations (in samples for which only TPH data were available) by the average percent-composition of petroleum at the appropriate area. These calculations, as well as the EPH and VPH concentrations estimated from the compositional information, are shown in Tables 9 and 10.

5) Exposure point concentrations were calculated for each exposure point using the measured EPH/VPH concentrations (when available) and calculated EPH/VPH concentrations (samples for which TPH data was converted to EPH/VPH concentrations). Exposure point concentrations for use in the risk assessment were the lesser of the 95% upper confidence limit (for data sets with 10 or more samples) and the maximum detected concentration. EPC calculations are shown in Tables 11 through 17.

SUMMARY OF PETROLEUM HYDROCARBONS RESULTS IN SURFACE SOIL
AREA 2 INDUSTRIAL
AOC 57 RF TABLE 1

SAMPLE ID	BX570100	BX570200	EX570200	EX571000	EX572500		MIN	MAX	
SAMPLE LOCATION	57B-95-01X	57B-95-02X	57E-95-02X	57E-95-10X	57E-95-25X	FOD	DETECT	DETECT	AVERAGE1
ANALYTES									
					The state of the s				7. C. S. S. S. S. S. S. S. S. S. S. S. S. S.
IPH (mg/Kg)	81	7970	454	25	81	5/2	25	7970	1722
SAT ME OFFICE AND ALL THE PRESENTANT CONTROL OF THE PROPERTY CONTROL OF THE PR	The annual results of the section of								
VPH RANGES (mg/Kg)		outside the					·		
C5 - C8 Aliphatics	¥	¥.	¥	NA	AM	N/A	N/A	N/A	N/A
C9 - C12 Aliphatics	¥	₹	¥	¥.	NA WA	N/A	N/A	Ϋ́Ν	N/A
C9 - C10 Aromatics	N	NA NA	NA	Ŋ	NA	N/A	N/A	N/A	N/A
			The state of the s	THE COLUMN THE PROPERTY OF THE	MMMMMM man a management of the contract and another the contract and an	AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA	and the state of t	7	cher de la companie d
EPH RANGES (mg/Kg)	The state of the s	The state of the s	The decrees the 1985 and the second of the		The state of the s	A AAAAAA OO AAAAAAAAAAAAAAAAAAAAAAAAAA	The second secon	distribution and arrangement and	and the second second to the second s
C9 - C18 Aliphatics	NA	N A	NA	AA	NA	ΝΆ	A/N	N/A	N/A
C19 -C36 Aliphatics	AN	N	NA	NA	NA:	N/A	N/A	ΑΝ	N/A
C11 - C22 Aromatics	Å	NA	NA	NA	NA NA	N/A	N/A	NA	N/A

NA = Not analyzed

TPH = Total Petroleum Hydrocarbons

VPH = Volatile Petroleum Hydrocarbons EPH = Extractable Petroleum Hydrocarbons

FOD = Frequency of detection mg/Kg = milligrams per kilograms N/A = Not applicable

¹ The average represents the arithmetic mean of all the sample results, with one-half the detection limit used for non-detects.

SUMMARY OF PETROLEUM HYDROCARBONS RESULTS IN SUBSURFACE SOIL AREA 2 INDUSTRIAL AOC 57 RF TABLE 2

SAMPLEID	BX570105	EX570106	BX570205	EX570405		NIM	MAX	
SAMPLE LOCATION	57B-95-01X	57E-95-01X	57B-95-02X	57E-95-04X(+ dup)	FOD	DETECT	DETECT	AVERAGE ¹
ANALYTES								
TPH (mg/Kg)	26	141	87	19	4/4	19	141	68
VPH RANGES (mg/Kg)								
C5 - C8 Aliphatics	AN	ΑN	NA	NA	N/A	N/A	N/A	N/A
C9 - C12 Aliphatics	NA	AN	NA	AN	N/A	N/A	N/A	N/A
C9 - C10 Aromatics	AN	NA	NA	NA	N/A	N/A	N/A	N/A
EPH RANGES (mg/Kg)								
C9 - C18 Aliphatics	NA	ΑN	AN	NA	N/A	N/A	N/A	N/A
C19 -C36 Aliphatics	NA	۷V	NA	NA	N/A	N/A	N/A	N/A
C11 - C22 Aromatics	AN	۷A	NA	NA	N/A	N/A	N/A	N/A

NA = Not analyzed

TPH = Total Petroleum Hydrocarbons

VPH ≈ Volatile Petroleum Hydrocarbons

EPH = Extractable Petroleum Hydrocarbons

mg/Kg = milligrams per kilograms

N/A = Not applicable

1 The average represents the arithmetic mean of all the sample results, with one-half the detection limit used for non-detects.

SUMMARY OF PETROLEUM HYDROCARBONS RESULT IN SURFACE SOIL AREA 2 RECREATIONAL AOC 57 RF TABLE 3

SAMPLEID	EX571200	FX571200 FX571600 EX	EX571700	(571700 SF570101 SF570200	SF570200	SF570401	SF570601	SF570700	SF570701	SF570800	SF570900
SAMPLE LOCATION	57E-95-12X	57E-95-12X 57E-95-16X 57E	57E-95-17X	57S-98-01F	57S-98-02F	57S-98-04F	57S-98-06X	57S-98-06X 57S-98-07X(+ dup)	57S-98-07X	57S-98-07X 57S-98-08X 57S-98-09X	57S-98-09X
ANALYTES	A CONTRACTOR OF THE PROPERTY O								***************************************		
TPH (mg/Kg)	5110	169	2390	393	1200	1150	4620	4000	17000	494	1930
VPH RANGES (ma/Kg)	***************************************		1								
C5 - C8 Aliphatics	ΑΝ	Ą	MA M	<1.3	<2.5	<1.3	<2.3	<9.0	<3.5	<5.3	<3.6
C9 - C12 Aliphatics	ΑΝ	ΑN	NA A	4.3	2.5	<1.3	3.9	9.82	15	6.4	6.4
C9 - C10 Aromatics	NA	A	NA NA	<1.3	<2.5	<1.3	<2.3	16.5	<3.5	13	<3.6
EPH RANGES (mg/Kg)											
C9 - C18 Aliphatics	NA A	¥	Ϋ́	<44	<55	<37	120	<165	270	<100	<83
C19 -C36 Aliphatics	AN AN	Ϋ́	¥	68	360	260	830	1950	1600	<100	240
C11 - C22 Aromatics	AN	Ą	ΝΑ	<44	240	140	190	550	450	<100	110

NA = Not analyzed
TPH = Total Petroleum Hydrocarbons
VPH = Volatile Petroleum Hydrocarbons
EPH = Extractable Petroleum Hydrocarbons

mg/Kg = milligrams per kilograms
FOD = Frequency of detection
N/A = Not applicable
1 The average represents the arithmetic mean of all the sample results, with one-half the detection limit used for non-detects.

TABLE 3
SUMMARY OF PETROLEUM HYDROCARBONS RESULT IN SURFACE SOIL
AREA 2 RECREATIONAL
AOC 57 RF

SAMPLE ID		NIW N	MAX	
SAMPLE LOCATION	FOD	DETECT	DETECT	DETECT DETECT AVERAGE
ANALYTES				
TPH (mg/Kg)	11/11	169	17,000	3496
VPH RANGES (mg/Kg)				
C5 - C8 Aliphatics	8/0	Y/N	N/A	1.8
C9 - C12 Aliphatics	2//8	2.5	15	6.1
C9 - C10 Aromatics	2/8	13	16.5	4.6
EPH RANGES (mg/Kg)			:	
C9 - C18 Aliphatics	2/8	120	270	79
C19 -C36 Aliphatics	2/8	68	1950	670
C11 - C22 Aromatics	9/9	110	550	247

NOTES:
NA = Not analyzed
TPH = Total Petroleum Hydrocar
VPH = Votatile Petroleum Hydro
EPH = Extractable Petroleum Hy

mg/Kg = milligrams per kilogram FOD = Frequency of detection N/A = Not applicable ' The average represents the ari

SUMMARY OF PETROLEUM HYDROCARBONS RESULTS IN SUBSURFACE SOIL AREA 2 RECREATIONAL AOC 57 RF TABLE 4

SAMPLE LOCATION 57E-95-07X	1 EX570804	EX570704 EX570804 EX570905 EX571305	EX571305	EX571406	EX571502	EX571602	EX571802	EX571902	EX571502 EX571602 EX571802 EX571902 EX572005 SF570302	SF570302	SF570503
Τ	57E-95-07X 57E-95-08X 57E-95-09X 57E-95-13X 57E-95-14X 57E-95-15X 57E-95-16X 57E-95-18X 57E-95-19X	57E-95-09X	57E-95-13X	57E-95-14X	57E-95-15X	57E-95-16X	57E-95-18X	57E-95-19X	57E-95-20X	57S-98-03F	57S-98-05F
			40.00							TOTAL THE PARTY OF	
TPH (mg/Kg) 31,800	28	29	<28	49	26,100	30,000	50	130	63	14,800	1750
VPH RANGES (mg/Kg)									THE PERSON NAMED AND ADDRESS OF THE		
C5 - C8 Aliphatics NA	≨	¥	∀	¥	¥	ΨN	ΝA	N	ž	41.6	0.1.
C9 - C12 Aliphatics NA	NA	Y Y	¥ X	¥	¥	ž	ΑN	ΑN	Ϋ́	1.9	2.1
C9 - C10 Aromatics NA	¥	¥	¥	NA	N	M	¥	¥¥	¥	<1.6	<1.0
EPH RANGES (mg/Kg)		-									
C9 - C18 Aliphatics NA	AN AN	¥	Ϋ́	¥	¥	ΑN	ΑN	ΝA	ž	110	\$
C19 -C36 Aliphatics NA	NA	ΑN	₹	A'A	₹	¥	Ā	ΑN	¥	3300	610
C11 - C22 Aromatics NA	NA	¥	¥	ΑA	ΑA	₩	¥	ΑĀ	AN AN	066	140

NA = Not analyzed TPH = Total Petroleum Hydrocarbons

VPH = Volatile Petroleum Hydrocarbons EPH ≈ Extractable Petroleum Hydrocarbons

N/A = Not applicable

mg/Kg = miligrams per kilograms FOD = Frequency of detection ¹ The average represents the arithmetic mean of all the sample results, with one-half the detection limit used for non-detects.

TABLE 4
SUMMARY OF PETROLEUM HYDROCARBONS RESULTS IN SUBSURFACE SOIL
AREA 2 RECREATIONAL
AOC 57 RF

SAMPLE ID		MIN	MAX	
SAMPLE LOCATION	FOD	DETECT	DETECT	DETECT DETECT AVERAGE
ANALYTES				
TPH (mg/Kg)	11/12	49	31,800	8741
VPH RANGES (mg/Kg)				
C5 - C8 Aliphatics	0/5	∀/N	N/A	1.3
C9 - C12 Aliphatics	2/2	1.9	2.1	7
C9 - C10 Aromatics	0/2	Α×	Š	1.3
	:			
EPH RANGES (mg/Kg)				
C9 - C18 Aliphatics	1/2	110	110	63.2
C19 -C36 Aliphatics	2/2	610	3300	1955
C11 - C22 Aromatics	2/2	140	066	565

NOTES:
NA = Not analyzed
TPH = Total Petroleum Hydrocar
VPH = Volatile Petroleum Hydro
EPH = Extractable Petroleum Hy

N/A = Not applicable

mg/Kg = milligrams per kilogram FOD = Frequency of detection ¹ The average represents the ari

SUMMARY OF PETROLEUM HYDROCARBONS RESULTS IN SURFACE SOIL AREA 3 INDUSTRIAL AOC 57 RF TABLE 5

SAMPLE ID	BX570800	BX570900	EX57W05X	EX57W10X	EX57W02X	EX57W17X		ZIZ	MAX	
SAMPLE LOCATION	57B-95-08X	57B-95-09X	ANNUAL PROPERTY AND A SAN A SA				FOD	DETECT	DETECT	AVERAGE ¹
ANALYTES			wanteen (state) by the contract of the contra		Commission of the commission o	THE PROPERTY OF THE PROPERTY O	And the second second second			
		30	MA	VΝ	NΔ	ΔN	212	30	20	44.5
FPH (Mg/Kg))	60	CAT	A	MANUSCONIA CARACTER MANUSCANIA CONTRACTOR AND A CONTRACTO	The state of the s			}	
ACCIONA AND ACCIONATION ACCIONATICA ACCIONATION ACCIONATICA ACCION	AND AND AND AND AND AND AND AND AND AND	AND THE PROPERTY OF THE PROPER	A STORE PROPERTY OF THE STORE	And the second s		CONTRACTOR OF THE PROPERTY OF	date or charge two /decorrections of		Trapped to the second s	Annual and Committee of the Committee of
VPH RANGES (mg/Kg)				The state of the s	The state of the s					
C5 - C8 Aliphatics	₹	NA	<19	<15.5	<21.5	<16	0/4	N/A	A/N	A/A
C9 - C12 Aliphatics	N A	NA	<4.7	<3.85	<5.35	16	1/4	16	16	5.74
C9 - C10 Aromatics	₩	NA	<4.7	<3.85	4,85	4	1/4	4.85	4.85	2.78
Notation page, the advantage of the second for a real production of the second for the second	CAMPAGNACO CONTRACTOR OF ALANA CONTRACTOR CONTRACTOR OF A CONT	THE RESIDENCE AND ASSESSED TO THE SECOND ASSESSED ASSESSED.	in the second of	CO. D. C. CONTROLLED C	contitue (PETERON Appearance or continue of the CE CE CE CE CE CE CE CE CE CE CE CE CE	TO THE PARTY OF TH				
EPH RANGES (ma/Ka)	Andrew An	To the second control of the second control	Westernam Metaure (C.) I saturated properties (M.) a conservation	The particular are considered and particular and pa						
C9 - C18 Aliphatics	NA NA	AN	<6.4	<6.95	<7.25	<3.6	0/4	ΑΝ	N/A	ΑΝ
C19 -C36 Aliphatics	NA NA	NA NA	<6.4	<6.95	7.28	<4.8	1/4	7.28	7.28	4.09
C11 - C22 Aromatics	AN	AA	<17	<18.5	<19.5	<19	0/4	N/A	N/A	N/A
		, and the same of								ı

NA = Not analyzed
TPH = Total Petroleum Hydrocarbons
VPH = Volatile Petroleum Hydrocarbons
EPH = Extractable Petroleum Hydrocarbons
N/A = Not applicable

mg/Kg = milligrams per kilograms FOD = Frequency of Detection ¹ The average represents the arithmetic mean of all the sample results, with one-half the detection limit used for non-detects.

SUMMARY OF PETROLEUM HYDROCARBONS RESULTS IN SUBSURFACE SOIL AREA 3 INDUSTRIAL AOC 57 RF TABLE 6

SAMPLE LOCATION 57B-	5/0802	X570805 BX570905	BX571110	EX57W06X	EX57W06X EX57W07X EX57W08X EX57W09X EX57F01X EX57F02X	EX5/WU8X	EX5/WUSK I	EX5/F01X	=X57F02X
	X80-96-	B-96-08X 57B-96-09X 57	57B-96-11X (+dup)						
ANALYTES									
TPH (mg/Kg)	<28	<28	25	NA ************************************	N .	NA MA	NA NA	NA	NA A
VPH RANGES (mo/Kg)	Marie Marie Company Company	100000	NAMERICA (NAMEDIA) (NAMEDI		10 (10 (10 (10 (10 (10 (10 (10 (10 (10 (AD THE TRANSPORT OF THE THE TRANSPORT OF	AND AND AND AND AND AND AND AND AND AND	S	The second section of the section of the sect
when controlled in the control of th	N A	NA NA	NA	<18	<18	<18	<15	<18	<18
	¥	¥	NA NA	×4.6	<4.5	<4.5	<3.7	<4.6	<4.6
C9 - C10 Aromatics	ΝΑ	N	NA	<4.6	<4.5	<4.5	<3.7	<4.6	<4.6
							Nome Address		
EPH RANGES (mg/Kg)									
	N A	¥	ΑΝ	<6.4	တ	<6.3	<6.3	78	<7.6
	ΑΑ	¥	NA	20	440	10	<6.3	066	12
C11 - C22 Aromatics	N A	¥	NA	<17	37	<17	<17	110	<20

NOTES:
NA = Not analyzed
TPH = Total Petroleum Hydrocarbons

EPH = Extractable Petroleum Hydrocarbons VPH = Volatile Petroleum Hydrocarbons

N/A = Not applicable

mg/Kg = milligrams per kilograms FOD = Frequency of detection ¹ The average represents the arithmetic mean of all the sample results, with one-half the detection limit used for non-detects.

SUMMARY OF PETROLEUM HYDROCARBONS RESULTS IN SUBSURFACE SOIL
AREA 3 INDUSTRIAL
AOC 57 RF TABLE 6

SAMPLE LOCATION FOD ANALYTES			
ANALYTES	DETECT	DETECT	AVERAGE1
TPH (mg/Kg) 1/3	3 25	25	17.7
VPH RANGES (ma/Ka)	A room of company and in the state of the st		
C5 - C8 Aliphatics 0/6	6 N/A	N/A	N/A
C9 - C12 Aliphatics 0/6	: — :- !	N/A	NA
	9/N 9	N/A	N/A
EPH RANGES (mg/Kg)			
C9 - C18 Aliphatics 2/6	6 9	78	16.7
C19 -C36 Aliphatics 5/6	اة 10	066	246
C11 - C22 Aromatics 2/6	6 37	110	30.4

NOTES:
NA = Not analyzed
TPH = Total Petroleum Hydrocarbo
VPH = Volatile Petroleum Hydrocar
EPH = Extractable Petroleum Hydr

N/A = Not applicable
mg/Kg = milligrams per kilograms
FOD = Frequency of detection
1 The average represents the arith

TABLE 7
SUMMARY OF PETROLEUM HYDROCARBONS RESULTS IN SURFACE SOIL
AREA 3 RECREATIONAL
AOC 57 RF

SAMPLEID	SF571301	SF571401	EX5703X	EX57W14X	EX57W14X EX57W15X	EX57W16X		Z	MAX	
SAMPLE LOCATION	57S-98-13F	57S-98-14F					FOD	DETECT	DETECT	AVERAGE ¹
ANALYTES										The second color and the second color
TPH (mg/Kg)	951	895	NA NA	NA	NA	NA	2/2	895	951	923
VPH RANGES (ma/Ka)										
C5 - C8 Aliphatics	<1.8	<1.4 4.1>	<15	. <17	<23	<150	9/0	Y/N	N/A	N/A
C9 - C12 Aliphatics	3.7	<1.4	47	110	<5.7	1500	4/6	3.7	1500	277
C9 - C10 Aromatics	<1.8	4,1>	37	55	<5.7	009	3/6	37	009	116
EPH RANGES (ma/Ka)										
C9 - C18 Aliphatics	<46	<40	<7.5	920	765	1300	3/6	765	1300	505
C19 -C36 Aliphatics	180	150	<7.5	20,000	7200	8600	9/9	150	20,000	6022
C11 - C22 Aromatics	9	75	<20	3100	1200	1400	9/9	09	3100	974

NOTES:

NA = Not analyzed

TPH = Total Petroleum Hydrocarbons

VPH = Votatile Petroleum Hydrocarbons

EPH = Extractáble Petroleum Hydrocarbons

N/A = Not applicable

mg/Kg = milligrams per kilograms FOD = Frequency of detection from the following section from the following section from the average represents the arithmetic mean of all the sample results, with one-half the detection limit used for non-detects.

SUMMARY OF PETROLEUM HYDROCARBONS RESULTS IN SUBSURFACE SOIL
AREA 3 RECREATIONAL AOC 57 RF TABLE 8

SAMPLE ID	SX571503		NEW	MAX	
SAMPLE LOCATION	57S-98-15X	FOD	DETECT	DETECT	AVERAGE ¹
ANALYTES					
TPH (mg/Kg)	\$27.9	1/0	N/A	N/A	N/A
VPH RANGES (mg/Kg)	tion takes that commissions and is a commission to the commission of the commission				
C5 - C8 Aliphatics	<1.3	1/0	A/A	N/A	N/A
C9 - C12 Aliphatics	<1.3	20	NA	N/A	NA
C9 - C10 Aromatics	4.3	0,1	N/A	N/A	¥N N N
EPH RANGES (mg/Kg)					
C9 - C18 Aliphatics	<37	0/1	NA	N/A	N/A
C19 -C36 Aliphatics	<37	1/0	N/A	NA	N/A
C11 - C22 Aromatics	<37	67	N/A	N/A	A/A

NOTES:

TPH = Total Petroleum Hydrocarbons

VPH = Volatile Petroleum Hydrocarbons EPH = Extractable Petroleum Hydrocarbons

mg/Kg = milligrams per kilograms

N/A = Not applicable Forequency of detection 1. The average represents the detection limit used for non-detects. The average represents the arithmetic mean of all the sample results, with one-half the detection limit used for non-detects.

TABLE 9
CALCULATION OF EPH/UPH CONCENTRATIONS FROM TPH DATA
AREA 2

		4 17 17 17				
ON-SITE SAMPLE ID OFF-SITE SAMPLE ID	SF570101 SX570101 19-May-08	AOC 57 RI	SF570200 SX570200 19-May-88		SF570302 SX570302 19-May-98	
DATE COLLECTED DATE ANALYZED	19-May-98	ADJ %	19-May-98	ADJ %	19-May-98	ADJ %
Off-Site TPH (mg/Kg-dry)	393		1200		14800	
VPH Ranges (mg/Kg)						
n-C5 to n-C8 Aliphatic*	£ ;	4.3 5.70/	<2.5 J	7080 30	າ - 9.7 ×	1.9 0.043%
n-C9 to n-C12 Ailphatic n-C9 to n-C10 Aromatic	2 5	0.65 0.6%	<25	1.25 0.2%	7.0	0.8 0.018%
EPH Ranges (mg/Kg)						
n-C9 to n-C18 Aliphatic	*	200		27.5 4.4%	110	
n-C19 to n-C36 Aliphatic n-C11 to n-C22 Aromatic**	8 4	68 58.1% 22 18.8%	240	360 37.0% 240 38.0%	066 8	990 22.5%
TOTAL EPH/VPH		116.95		631.25 100%		4402.7 100%

TABLE 9
CALCULATION OF EPH/UPH CONCENTRATIONS FROM TPH DATA
AREA 2

ON-SITE SAMPLE ID OFF-SITE SAMPLE ID DATE COLLECTED DATE ANALYZED	SF570401 SX570401 19-May-98	4	8	SF570503 SX570503 19-May-98		**************************************	SF570601 SX570601 19-May-98		ā	***************************************	SF570700(+dup) SX570700(+dup) 19-May-98 19-May-98	Asserber : . Heren	A D.	*	SF570701 SX570701 19-May-98 20-May-98
Off-Site TPH (mg/Kg-dry)	1150	1 4 1 1 1 1		1750		1 1 1 1 1 1 1	4620				4000	۵			17000
VPH Ranges (mg/Kg) n-C5 to n-C8 Alibhatic*	۸ ش			× 1.0			42.3				<9.0	7			< 3.5
n-C9 to n-C12 Aliphatic*	<1.3	0.65 0.1	0.155%	2.1	2.1	. —	3.9	->	3.9	0.341%	9.825	ი	9.825 0	0.377%	15
n-C9 to n-C10 Aromatic	< 1.3	0.65	0.155%	× 1.0	0.5	0.065%	<2.3	.	1.15	0.100%	16.5	 		0.632%	< 3.5
EPH Ranges (mg/Kg) n-C9 to n-C18 Aliphatic		18.5	4.4%	88	16.5	1.0	120	د -	120	10.5%	<165	 		3.2%	270
n-C19 to n-C36 Aliphatic	280	760	61.9%	610	610	79.3%	830		830	72.5%	1950	· ·	1950	74.7%	1600
n-C11 to n-C22 Aromatic**	140	5	ၕ	1	40	18.2%	9		<u>2</u>	16.6%	220	4,		21.1%	450
TOTAL EPH/VPH		419.8 10	100%	1	769.1	100%			145.05	100%		26(2608.83	100%	

ON-SITE SAMPLE ID OFF-SITE SAMPLE ID DATE COLLECTED DATE ANALYZED	AD) %	AOC 57 RI SF570800 SX570800 19-May-98 20-May-98	Abu	**	SF570900 SX570900 19-May-98 20-May-98	ADJ	*
Off-Site TPH (mg/Kg-dry)		767			0861		
VPH Ranges (mg/Kg) n-C5 to n-C8 Aliphatic*		-5.3 J	ě	2 7780	985	, ,	1 BM1%
n-C9 to n-C12 Alipnatic n-C9 to n-C10 Aromatic	J 1.75 0.075%	• - • =	13	7.674%	88	, ,	T
EPH Ranges (mg/Kg) n-C9 to n-C18 Aliphatic			20	29.5%	88	4.6	10.4%
n-C19 to n-C36 Aliphatic n-C11 to n-C22 Aromatic**	1600 68.5% 450 19.3%	^ ^ ^ 6 8 6 8 8	20	29.5% 29.5%	110	240 10	60.0%
TOTAL EPH/VPH	2336.75 100%		169.4			399.7	100%

TABLE 9
CALCULATION OF EPH/UPH CONCENTRATIONS FROM TPH DATA
AREA 2

			א אשעא				
ON-SITE SAMPLE ID			AOC 57 RI 57B-95-01X		57B-95-02X		57E-95-02X
OFF-SITE SAMPLE ID	AVE	AVE	BX570100	VPH/EPH USING	BX570200	VPH/EPH USING	EX570200
DATE COLLECTED DATE ANALYZEĎ	ADJ	%	9/26/95	CORRELATION	9/27/95	CORRELATION	9/18/96
Off-Site TPH (mg/Kg-dry)			81		7970	(454
<u>VPH Ranges (mg/Kg)</u> n-C5 to n-C8 Aliphatic⁴				0		0	
n-C9 to n-C12 Aliphatic*	5.3	0.41%		0.33		32	
n-C9 to n-C10 Aromatic	3.8	0.29%		0.24		23	
EPH Ranges (mg/Kg)		600		,		9	
n-C9 to n-C18 Allipnatic	6.07	5.03%		4./		403	
n-C19 to n-C36 Aliphatic	926.8	71.29%		58		5682	
n-C11 to n-C22 Aromatic**	288.2	22.17%		18		1767	
TOTAL EPH/VPH	1300	100%		81		7970	

TABLE 9 CALCULATION OF EPH/UPH CONCENTRATIONS FROM TPH DATA AREA 2

		K7E 05.10X	AOC 57 RI	57E-95-25X		57E-95-12X		57E-95-16X
ON-SITE SAMPLE ID OFF-SITE SAMPLE ID DATE COLLECTED DATE ANALYZED	VPH/EPH USING CORRELATION	9/19/95	VPH/EPH USING CORRELATION	EX572500 9/22/95	VPH/EPH USING CORRELATION	EX571200 9/20/95	VPH/EPH USING CORRELATION	EX571600 9/21/95
Off-Site TPH (mg/Kg-dry)		25		81		5110		169
VPH Ranges (mg/Kg) n-C5 to n-C8 Aliphatic* n-C9 to n-C12 Aliphatic*	0 0. 0		0.102		0.33		0 21 15	
n-C9 to n-C10 Aromatic EPH Ranges (mg/Kg)	5 5						2 860	
n-C9 to n-C18 Aliphatic n-C19 to n-C36 Aliphatic n-C11 to n-C22 Aromatic**	26 324 101		18		58 58 18		3643 1133	
TOTAL EPH/VPH	454		25		81		5110	

TABLE 9
CALCULATION OF EPH/UPH CONCENTRATIONS FROM TPH DATA
AREA 2

ON-SITE SAMPLE ID		57E-05-17X	AOC 57 RI	578.05.01X		67B 06 02Y	
OFF-SITE SAMPLE ID	VPH/EPH USING	EX571700	VPH/EPH USING	BX570105	VPH/EPH USING	BX570205	VPH/EPH USING
DATE COLLECTED DATE ANALYZED	CORRELATION	9/21/95	CORRELATION	9/26/95	CORRELATION	9/27/95	CORRELATION
Off-Site TPH (mg/Kg-dry)		2390		26		87	
VPH Ranges (mg/Kg) n-C5 to n-C8 Aliphatic*	0		0		0		0
n-C9 to n-C12 Aliphatic*	0.69		10		0.108		0.35
n-C9 to n-C10 Aromatic	0.49		7.0		0.077		0.25
EPH Ranges (mg/Kg) n-C9 to n-C18 Aliphatic	6.6		139		t.		1.
n-C19 to n-C36 Aliphatic	120		1704		19		62
n-C11 to n-C22 Aromatic**	37		530		5.9		19
TOTAL EPH/VPH	169		2390		26		87

TABLE 9
CALCULATION OF EPH/UPH CONCENTRATIONS FROM TPH DATA
AREA 2

ON-SITE SAMPLE ID OFF-SITE SAMPLE ID DATE COLLECTED DATE ANALYZED	57B-95-04X BX570405 9/19/95	VPH/EPH USING CORRELATION	AOC 57 RI 57E-95-01X EX570106 '	RI VPH/EPH USING CORRELATION	57E-95-07X EX570704 9/19/95	VPH/EPH USING CORRELATION	57E-95-08X EX570804 9/20/95	VPH/EPH USING CORRELATION
Off-Site TPH (mg/Kg-dry)	19		141	_	31,800		58	
<u>VPH Ranges (mg/Kg)</u> n-C5 to n-C8 Aliphatic* n-C9 to n-C12 Aliphatic* n-C9 to n-C10 Aromatic		0 0.076 0.055		0 0.57 0.41		0 130 93		0.23 0.23 0.17
EPH Ranges (mg/Kg) n-C9 to n-C18 Aliphatic n-C19 to n-C36 Aliphatic n-C11 to n-C22 Aromatic**		1.1.		8.2 101 31		1855 22672 7050		8. 4.4 1.4 8.
TOTAL EPH/VPH		19		141		31800		58

TABLE 9
CALCULATION OF EPH/UPH CONCENTRATIONS FROM TPH DATA
AREA 2

ON-SITE SAMPLE ID OFF-SITE SAMPLE ID	57E-95-09X EX570905	VPH/EPH USING	AOC 57 RI 57E-95-13X EX571305	57E-95-13X 1/2 DETECT	VPH/EPH USING	57E-95-14X EX571406	VPH/EPH USING	57E-95-15X EX571502
DATE COLLECTED DATE ANALYZED	9/20/95	CORRELATION	9/21/95		CORRELATION	9/21/95	CORRELATION	9/21/95
Off-Site TPH (mg/Kg-dry)	79		<28	4+		49		26100
VPH Ranges (mg/Kg) n-C5 to n-C8 Aliohatic*		0			0			
n-C9 to n-C12 Aliphatic*		0.32			90.0		0.20	
n-C9 to n-C10 Aromatic		0.23			0.04		0.14	
EPH Ranges (mg/Kg)		4			C		o c	
n-cs to n-c to Ampliatic		5.5 5.5			20:0 86:6		35	
n-C11 to n-C22 Aromatic**		18			3.10		11	
TOTAL EPH/VPH		79			14		49	

CALCULATION OF EPH/UPH CONCENTRATIONS FROM TPH DATA AREA 2

AOC 57 RI

2 5 000			
ON-SITE SAMPLE ID	OFF-SITE SAMPLE ID	DATE COLLECTED	DATE ANA! YZED

VPH/EPH USING CORRELATION		106
OFF-SITE SAMPLE ID DATE COLLECTED DATE ANALYZED	Off-Site TPH (mg/Kg-dry)	VPH Ranges (mg/Kg) n-C5 to n-C8 Aliphatic* n-C9 to n-C12 Aliphatic* n-C9 to n-C10 Aromatic

1523 18608 5786

EPH Ranges (mg/Kg) n-C9 to n-C18 Aliphatic n-C19 to n-C36 Aliphatic n-C11 to n-C22 Aromatic**

TABLE 9
CALCULATION OF EPH/UPH CONCENTRATIONS FROM TPH DATA
AREA 2
AOC 57 RI

			ACC 5/ F	=				
ON-SITE SAMPLE ID	57E-95-16X		57E-95-18X		57E-95-19X		57E-95-20X	
OFF-SITE SAMPLE ID	EX571602	VPH/EPH USING	EX571802	VPH/EPH USING	EX571902	EX571902 VPH/EPH USING	EX572005	VPH/EPH USING
DATE COLLECTED DATE ANALYZED	9/21/95	CORRELATION	9/21/95	CORRELATION	9/21/95	CORRELATION	9/21/95	CORRELATION
Off-Site TPH (mg/Kg-dry)	30000		20		130		63	
VPH Ranges (mg/Kg) n-C5 to n-C8 Aliphatic*								
n-C9 to n-C12 Aliphatic*		122		0.20		0.53		0.25
n-C9 to n-C10 Aromatic		88		0.14		0.38		0.18
EPH Ranges (mg/Kg)								
n-C9 to n-C18 Aliphatic		1750		2.9		7.6		3.6
n-C19 to n-C36 Aliphatic		21388		35		93		45
n-C11 to n-C22 Aromatic**		6651		11		29		41
TOTAL EPH/VPH		30000		50		130		63

OFF-SITE SAMPLE ID DATE COLLECTED S-1 DATE ANALYZED (ug/g)	S-1 (ug/g)	SX571301 20-May-98 20-May-98	ADJ	76	SX671401 20-May-98 20-May-98	ADV	9/9
Off-Site TPH (mg/Kg-dry)	200	951			886		
<u>VPH Ranges (mg/Kg)</u> n-C5 to n-C8 Aliphatic* n-C9 to n-C12 Aliphatic* n-C9 to n-C10 Aromatic	100 1000 100	218 J	V 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	1.38% 0.34%	2	0.7	0.28%
EPH Ranges (mg/Kg) n-C9 to n-C18 Aliphatic n-C19 to n-C36 Aliphatic n-C11 to n-C22 Aromatic**	1000 2500 200	c46 180 60	15.23 180 80	8.59% 67.26% 22.42%	440 150 75	20 150 75	8.12% 60.88% 30.44%
TOTAL EPH/VPH			267.6	100%		246.4	100%

Notes:

**concentrations of target compounds including n-pentane, 2-methylpentane, MTBE, 2,2,4-trimethylpentane, n-noname, BTEX, 1,2,4-trimethyl and naphthalene have been subtacted when determining concentration.
** concentrations of PAH target compounds have been subtracted when determining concentration.

OFF-SITE SAMPLE ID SX671563 DATE COLLECTED 20:Way-98 DATE ANALYZED 20:Way-98		ADJ %	EXSTM05X 25-Mar-99	ADJ	2/4	EX57W10X 16-Apr-99	ABJ	%
Off-Site TPH (mg/Kg-dry)	<27.9		AM			##A		
VPH Ranges (mg/Kg) n-C5 to n-C8 Aliphatic* n-C9 to n-C12 Aliphatic* n-C9 to n-C10 Aromatic	413 413 413 0	0.65 1.14% 0.65 1.14%	613 7.42	22.23	11.96% 11.96%	<15.5 <3.85 <3.85	192	13.45% 13.45%
EPH Ranges (mg/Kg) n-C9 to n-C18 Aliphatic n-C19 to n-C36 Aliphatic n-C11 to n-C22 Aromatic**	11	18 5 32 57% 18 5 32 57% 18 5 32 57%	<64 <64 <17	9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9	16.33% 16.33% 43.37%	×6.95 ×6.95 ×18.5	84 68 84 84 84 84 84 84 84 84 84 84 84 84 84	24 37% 24 37% 24 37%
TOTAL EPH/VPH		56.8 100%	9%	19.6	100%		14.28	*DO*

Notes:

OFF-SITE SAMPLE ID EXE DATE COLLECTED 25 DATE ANALYZED	Off-Site TPH (mg/Kg-dry)	VPH Ranges (mg/Kg) n-C5 to n-C8 Aliphatic* n-C9 to n-C12 Aliphatic* n-C9 to n-C10 Aromatic	EPH Ranges (mg/Kg) n-C9 to n-C18 Aliphatic n-C19 to n-C36 Aliphatic n-C11 to n-C22 Aromatic**	TOTAL EPH/VPH
X574/02X 5-Mar 99		<21.5 <5.35 4.85	<7.25 7.28 <19.5	
ADJ		268 4.85	3.63 7.28 9.75	28.19
7,		9.51%	12 88% 25 82% 34 59%	100%
EXSTANT		516 16 44.0	<36 <48 <<19	
ADJ		65.52	# 55.00 44.00	31.7
%		60.47% 6.31%	5.68% 7.57% 29.97%	100%
EX57W14X		110 110 88	920 26,000 3100	
ADJ		110 55	920 20.000 31.00	24185
46		0.45% 0.23%	3.80% 82.70% 12.82%	5 100%

Notes:

OFF-SITE SAMPLE ID EXST DATE COLLECTED DATE ANALYZED	EX57W15X	ADJ	74	EX57W16X	ADJ	ş	EX57W06X 25-Mar-99	ADJ	94
Off-Site TPH (mg/Kg-dry)									
<u>VPH Ranges (mg/Kg)</u> n-C5 to n-C8 Alibhatic*	S.			s150			2 2 2 2		
n-C9 to n-C12 Aliphatic* n-C9 to n-C10 Aromatic	45.7 45.7	2.85 2.85	0.03%	1500	1500	11.19% 4.48%	6.45 6.45	233	5.34% 5.34%
EPH Ranges (mg/Kg) n-C9 to n-C18 Aliphatic n-C19 to n-C36 Aliphatic n-C11 to n-C22 Aromatic**	765 7200 1280	75 5 7200 1200	8.34% 78.51% 13.59%	1300 8600 1400	1305 8600 1400	9.70% 64.18% 10.45%	48.5	8 7 7 8 8 7 7 8	8.82% 55.10% 23.42%
TOTAL EPHIVPH		91707	*001		13400	100%		898	3 100%

Notes:
* concentrations of target compounds includi and naphthalene have been subtacted when ** concentrations of PAH target compounds

OFF-SITE SAMPLE ID 並然 DATE COLLECTED 25 DATE ANALYZED	Off-Site TPH (mg/Kg-dry)	VPH Ranges (mg/Kg) n-C5 to n-C8 Aliphatic* n-C9 to n-C12 Aliphatic* n-C9 to n-C10 Aromatic	EPH Ranges (mg/Kg) n-C9 to n-C18 Aliphatic n-C19 to n-C36 Aliphatic n-C11 to n-C22 Aromatic**	ТОТАL ЕРНИРН
EX574407X 25-Mar-99		A18 A45 445	9 440 37	
ADJ		2.25 2.25	9 440 37	490.5
7,0%		0.46% 0.46%	1.83% 89.70% 7.54%	100%
25-Mar-99		81.4.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.	\$6.3 to *17	
ADJ		88 88	3.15 10 8.5	26 15
. F		8 60% 8 60%	12.05% 38.24% 32.50%	100%
EX57W03X 16-Apr-99		\$5.55 \$7.75 \$4.77	7 5 4 1 V	
ADJ		1.85 1.85	67.6 67.8 68	18.5
70		10.00% 10.00%	17 03% 17 03% 45 85%	100%

Notes:

OFF-SITE SAMPLE ID EXS/FD1X DATE COLLECTED 25-Már-99 DATE ANALYZED ADJ **	Off-Site TPH (mg/Kg-dry)		n-C9 to n-C12 Aliphatic* <4.6 2.3 0.19% n-C9 to n-C10 Aromatic <4.6 2.3 0.19%	87 87	n-C19 to n-C36 Aliphatic 990 83,71% n-C11 to n-C22 Aromatic** 110 119 930%	
Ex57f02x 25-Mar-99 ADJ		÷	<18 <46 23 <46 23	<7.6	12 12 12 < 20 10	
46			7.57% 7.57%	12.50%	39.47% 32.89%	
EX57F03X 15.Apr.89 ADJ			47 47 37 37		47.5 3.75 420 to	
%			45.31% 36.45%	3.69%	3 69% 9 85%	

Notes:

OFF-SITE SAMPLE ID DATE COLLECTED DATE ANALYZED	ADJ AVE	AVE %	BX570800 8/28/96	VPH/EPH USING CORRELATION	BX570900 8/29/96	VPH/EPH USING CORRELATION
Off-Site TPH (mg/Kg-dry)			50		39	
VPH Ranges (mg/Kg) n-C5 to n-C8 Aliphatic*	93	% % %		17		<u>6.</u>
n-C9 to n-C10 Aromatic	43	1.39%		0.70		0.55
EPH Ranges (mg/Kg) n-C9 to n-C18 Aliphatic	197	6.42%		3.2		2.5
n-C19 to n-C36 Aliphatic	2353 379	76.50% 12.33%		38 6.2		30 4.9
TOTAL EPH/VPH	3075	100%		50		39

Notes:

OFF-SITE SAMPLE ID BX570805 BX570805 VPH/EPH USING DATE COLLECTED 8/29/96 1/2 DETECT CORRELATION DATE ANALYZED	BX570805 8/29/96	BX570805 1/2 DETECT	BX570805 VPH/EPH USING 1/2 DETECT CORRELATION	BX570905 8/29/96	•	BX570905 VPH/EPH USING 1/2 DETECT CORRELATION
Off-Site TPH (mg/Kg-dry)	<28	14		<28	14	
VPH Ranges (mg/Kg) n-C5 to n-C8 Aliphatic* n-C9 to n-C12 Aliphatic* n-C9 to n-C10 Aromatic			0.47			0.47 0.19
EPH Ranges (mg/Kg) n-C9 to n-C18 Aliphatic n-C19 to n-C36 Aliphatic n-C11 to n-C22 Aromatic**			0.90 11 7.7			0.90 11 1.7
ОТАL ЕРН//РН			14			14

OFF-SITE SAMPLE ID DATE COLLECTED DATE ANALYZED	EX570106 9/18/95	VPH/EPH USING CORRELATION	BX571110 9/3/96	BX571110 VPH/EPH USING 9/3/96 CORRELATION
Off-Site TPH (mg/Kg-dry)	141		25	
VPH Ranges (mg/Kg) n-C5 to n-C8 Aliphatic* n-C9 to n-C12 Aliphatic* n-C9 to n-C10 Aromatic		4.7		0.84 0.35
EPH Ranges (mg/Kg) n-C9 to n-C18 Aliphatic n-C19 to n-C36 Aliphatic n-C11 to n-C22 Aromatic***		9.1 108 17		6. 9.1 1.6
тотас ернирн		141		25

Notes:

EXPOSURE POINT CONCENTRATIONS PETROLEUM HYDROCARBONS IN SURFACE SOIL AREA 2 INDUSTRIAL AOC 57 RI

SAMPI F ID	BX570100	BX570200	EX570200	EX571000	EX572500		MAX	%56	
SAMPLE LOCATION	57B-95-01X	57B-95-02X	57E-95-02X	57E-95-10X	57E-95-25X	AVERAGE ¹	DETECT	NCL	EPC ²
ANALYTES		A CONTRACTOR CONTRACTO		St., and St. St. St. St. St. St. St. St. St. St.		According to the control of the cont	and a second device of the second second	A. CARLES AND A. CARLES AND AND AND AND AND AND AND AND AND AND	SSENSON ARMANDAMENTAL AND ANNO ACTION
TD11 / 1/2 - 3	0.4	0202	754	25		M/A	N/A	A/N	N/A
PH (mg/kg)	-0	2181	LOL	O H				edidaetaminated dark McMidiatairesterne	WA AND AN INCOME.
VPH RANGES (ma/Ka)*	Mark the state of			and the state of t	The state of the s	The state of the s	The state of the s	And added to the second of the second	to the second of
C5 - C8 Aliphatics	QN	9	2	2	ND ON	A/A	N/A	N/A	N/A
C9 - C12 Aliphatics	0.33	32	1.9	0.1	0.33	6.9	32	SC	32
C9 - C10 Aromatics	0.24	23	1.3	0.073	0.24	5.0	23	2	23
i sa shininin na shakhandan dalip massanisisan a dalah dakkanana hasisi anadarista dalah sa	Control of the second s	The second of th			de volumentale en en en en en en en en en en en en en	Control of the contro			er er en de de de Presse Schere Schere en en
EPH RANGES (ma/Kg)*	Andrew Company of the control of the								
C9 - C18 Aliphatics	4.7	465	26	1.5	4.7	100	465	ပ္က	465
C19 -C36 Aliphatics	58	5682	324	18	58	1228	5682	S	5682
C11 - C22 Aromatics	18	1767	101	9	18	382	1767	NC	1767

NOTES:

TPH = Total Petroleum Hydrocarbons

VPH = Volatile Petroleum Hydrocarbons

EPH = Extractable Petroleum Hydrocarbons

ND = No data

mg/Kg = milligrams per kilograms

ULC = The 95% upper confidence limit of the airthmetic mean.

EPC = Exposure point concentration

N/A = Not applicable

NC = Not calculated because there are fewer than 10 samples.

The average represents the arithmetic mean of all the sample results, with one-half the detection limit used for non-detects.

² THE EPC is the lesser of the maximum detected concentration and the 95% UCL.

3 The EPC for TPH is not calculated because petroleum hydrocarbon fractions are evaluated instead of TPH.

* Values for 1995 data have been calculated from EPH/VPH compositional data. See Table @.

PETROLEUM HYDROCARBONS IN SUBSURFACE SOIL **EXPOSURE POINT CONCENTRATIONS** AREA 2 INDUSTRIAL **AOC 57 RI**

SAMPLE ID	BX570105	EX570106	BX570205	EX570405		MAX	95%	
SAMPLE LOCATION	57B-95-01X	57E-95-01X	57B-95-02X	57E-95-04X(+ dup)	AVERAGE ¹	DETECT	ncr	EPC ²
ANALYTES	Assessment and desired visiting to the Visit of the second	and the second s		contract to 1. In 11. As distances to the state of	the discrete of sections of metropoles	The state of the s	***************************************	propriation to the second of
TPH (mg/Kg)³	26	141	87	10	ΝΆ	NA	N/A	NA
VPH RANGES (ma/Ka)*	the property of the control of the c			We appear that the second seco	Notes to the second sec			
C5 - C8 Aliphatics	ON	QN.	Q.	Q.	N/A	N/A	A/N	N/A
C9 - C12 Aliphatics	0.11	0.57	0.35	0.076	0.28	0.57	NC	0.57
C9 - C10 Aromatics	0.077	0.41	0.25	0.055	0.20	0.41	SC	0.41
EPH RANGES (ma/Ka)*	•				and the second s			:
C9 - C18 Aliphatics	1.5	8.2	5.1	-	4.0	8.2	N ON	8.2
C19 -C36 Aliphatics	19	101	62	13	49	101	SON	101
C11 - C22 Aromatics	5.9	31	19	4	15	31	NC	31

NOTES:

TPH = Total Petroleum Hydrocarbons

VPH = Volatile Petroleum Hydrocarbons

EPH = Extractable Petroleum Hydrocarbons

ND = No data

mg/Kg = milligrams per kilograms

ULC = The 95% upper confidence limit of the airthmetic mean. EPC = Exposure point concentration

N/A = Not applicable

NC = Not calculated because there are fewer than 10 samples.

¹ The average represents the arithmetic mean of all the sample results, with one-half the detection limit used for non-detects.

² THE EPC is the lesser of the maximum detected concentration and the 95% UCL.

³ The EPC for TPH is not calculated because petroleum hydrocarbon fractions are evaluated instead of TPH.

^{*} Values for 1995 data have been calculated from EPH/VPH compositional data. See Table @.

PETROLEUM HYDROCARBONS IN SURFACE SOIL EXPOSURE POINT CONCENTRATIONS AREA 2 RECREATIONAL TABLE 13

	1"	c
	SF570701	< : CS-C/C
	SF570700 SF570701 S	1010 + X / 17X7 / X
	EX571200 EX571600 EX571700 SF570101 SF570200 SF570401 SF570601 SF570700 SF570701 S	C X C T X T X T X T X T X T X T X T X T
AOC 57 RI	SF570200 SF57	170 08 07 TO TO TO TO TO TO TO TO TO TO TO TO TO
	0 SF570101	77 57C 08 01E
	71600 EX57170	1 40V 1170 OF 4
	EX571200 EX5	こしてい くくて せく じてい
		-

SAMPLEID	EX571200	EX571200 EX571600 EX571700 SF570101 SF570200 SF570401	EX571700	SF570101	SF570200	SF570401	SF570601	SF570700	SF570701	SF570800 SF570900	SF570900
SAMPLE LOCATION	57E-95-12X	57E-95-12X 57E-95-16X 57E-	57E-95-17X	57S-98-01F	57S-98-02F	57S-98-04F	57S-98-06X	57S-98-01F 57S-98-02F 57S-98-04F 57S-98-06X 57S-98-07X(+ dup) 57S-98-07X 57S-98-08X 57S-98-09X	57S-98-07X	57S-98-08X	57S-98-09X
ANALYTES											
TPH (mg/Kg)³	5110	169	2390	393	1200	1150	4620	4000	17000	494	1930
VPH RANGES (ma/Ka)*				400	Question of the second				Problems (A. et al., other construction of the	Annual to the second se	A
C5 - C8 Alliphatics	2	2	2	2	2	Q	2	2	2	2	2
C9 - C12 Alinhatics	21	69.0	10	4.3	2.5	0.65	3.9	9.82	5	6.4	6.4
C9 - C10 Aromatics	15	0.49		0.65	1.25	0.65	1.15	16.5	1.75	13	1.8
ALL MANUAL MANUAL MANUAL MANUAL AND AND AND AND AND AND AND AND AND AND							ada, Chama satah a ata a a a a a a	S. Amad Sabasa (1988) (1981) (1994) (SAM) (Amag Amag Amag Amag Amag Amag Amag Amag	The state of the s		
EPH RANGES (mg/Kg)*								, , , , , , , , , , , , , , , , , ,			
C9 - C18 Aliphatics	298	6.6	139	22	27.5	18.5	120	82.5	270	20	41.5
C19 -C36 Aliphatics	3640	120	1700	89	360	260	830	1950	1600	20	240
C11 - C22 Aromatics	1130	37	530	22	240	140	190	550	450	20	110

TPH = Total Petroleum Hydrocarbons

VPH = Volatile Petroleum Hydrocarbons EPH ≠ Extractable Petroleum Hydrocarbons

ND = No data

mg/Kg = milligrams per kilograms ULC = The 95% upper confidence limit of the airthmetic mean. EPC = Exposure point concentration

N/A = Not applicable

1 The average represents the arithmetic mean of all the sample results, with one-half the detection limit used for non-detects.

² THE EPC is the lesser of the maximum detected concentration and the 95% UCL.

³ The EPC for TPH is not calculated because petroleum hydrocarbon fractions are evaluated instead of TPH.

TABLE 13
EXPOSURE POINT CONCENTRATIONS
PETROLEUM HYDROCARBONS IN SURFACE SOIL
AREA 2 RECREATIONAL
AOC 57 RI

SAMPLE ID		MAX	%56	:
SAMPLE LOCATION	AVERAGE1	DETECT	UCL	EPC ²
ANALYTES				
TPH (mg/Kg)³	N/A	N/A	N/A	NA
VPH RANGES (mg/Kg)*				
C5 - C8 Aliphatics	N/A	N/A	A/A	¥× ×
C9 - C12 Aliphatics	7.3	21	53	27
C9 - C10 Aromatics	5.4	17	24	14
EPH RANGES (mg/Kg)*	ekinsens en sin titter som sige til men et	de service constant administration del Service con	1 PROPERTY 1 PROPERTY 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	na wanane muran anarena
C9 - C18 Aliphatics	86	298	343	298
C19 -C36 Aliphatics	983	3640	5763	3640
C11 - C22 Aromatics	314	1130	1361	1130

NOTES:

TPH = Total Petroleum Hydrocarb VPH = Volatile Petroleum Hydroc EPH = Extractable Petroleum Hyd ND = No data

mg/Kg = milligrams per kilograms ULC = The 95% upper confidence EPC = Exposure point concentrali

N/A = Not applicable
The average represents the arit

² THE EPC is the lesser of the m

 Values for 1995 data have been 3 The EPC for TPH is not calculat

TABLE 14 EXPOSURE POINT CONCENTRATIONS PETROLEUM HYDROCARBONS IN SUBSURFACE SOIL AREA 2 RECREATIONAL AOC 57 RI

SAMPLE LOCATION 57E-95-07X 57E-95-08X 57 ANALYTES 31,800 58 TPH (mg/Kg) 31,800 58 YPH RANGES (mg/Kg) ND ND C5 - C8 Aliphatics 130 0.23 C9 - C12 Aliphatics 93 0.17	08X 57E-95-(9X 57E	57E-95-14X E	57E-95-15X	57E-95-16X		A STANDER OF THE PROPERTY OF T			A
			49	According to the second		57E-95-18X	57E-95-19X	57E-95-20X	57S-98-03F	57S-98-05F
K <u>a</u>)			49		The second of the second of the standard of th		Service Servic	arman and a second as a second	A CONTRACTOR AND ADDRESS OF VALUE OF A	A CLARITA DE CAME DONA DE PARA
1,000 Kg) ND 130	and an area of the control of the co		2	26 100	30 000	50	130	63	14,800	1750
Kg) ND 130 93	A COLUMN TO THE PARTY OF THE PA	9. 0 - 000000		2	200					
ND 130 93			The second secon		de monte e constante de la con	The state of the s		Miles Message of the Greekstanders and agent	the special processor by the special property of	the state of the s
130			QN	2	Q	8	2	9	Q	Q
93		0.06	0.2	106	122	0.2	0.53	0.25	1.9	2.1
28	0.03		0.14	76	88	0.14	0.38	0.18	<1.6	<1.0
	&	man manifes on or		÷	}					
man) - an' distributiva de mana distributiva de mana mana de sa ante de coltina de la coltina de manada de coltina de manada de coltina de la		and the continues of the state	or of the code of the contract of the contract of the code of the		S. A. L. C. C. C. C. C. C. C. C. C. C. C. C. C.	hanners are an entremembership	A se the second			
EPH RANGES (mg/Kg)										
Co - C18 Alinhatics 1855 3.4		0.82	2.9	1523	1750	2.9	7.6	3.6	01.1	<33
	56	10	35	18,600	21,400	35	83	45	3300	610
	18	3.1	11	5786	6651	11	29	14	066	140

NOTES:
NA = Not analyzed
TPH = Total Petroleum Hydrocarbons
VPH = Volatile Petroleum Hydrocarbons
EPH = Extractable Petroleum Hydrocarbons
N/A = Not applicable

mg/Kg = milligrams per kilograms FOD = Frequency of detection The average represents the arithmetic mean of all the sample results, with one-half the detection limit used for non-detects.

TABLE 14 EXPOSURE POINT CONCENTRATIONS PETROLEUM HYDROCARBONS IN SUBSURFACE SOIL AREA 2 RECREATIONAL AOC 57 RI

SAMPLE ID		MAX	95%	
SAMPLE LOCATION	AVERAGE1	DETECT	ไวก	EPC ²
ANALYTES	A company of the second day of the			
TPH (mg/Kg)	N/A	N/A	Z/A	N/A
VPH RANGES (ma/Kg)			:	
C5 - C8 Aliphatics	N/A	N/A	W/A	N/A
C9 - C12 Aliphatics	364	130	33,200	130
C9 - C10 Aromatics	22	93	22,200	93
EPH RANGES (mg/Kg)	di sa si ilina dan si samuni, aya w	consider streets are seen seen seen	de material and a contract of the contract of	2
C9 - C18 Aliphatics	440	1855	625,000	1855
C19 -C36 Aliphatics	5577	22,700	12,200,000	22,700
C11 - C22 Aromatics	1726	7050	3,510,000	7050

NOTES:
NA = Not analyzed
TPH = Total Petroleum Hydrocar
VPH = Volatile Petroleum Hydro
EPH = Extractable Petroleum Hy

N/A = Not applicable

mg/Kg = milligrams per kilogram FOD = Frequency of detection ¹ The average represents the ar

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EXPOSURE POINT CONCENTRATIONS PETROLEUM HYDROCARBONS IN SURFACE SOIL AREA 3 INDUSTRIAL AOC 57 RI

SAMPLE ID	BX570800	BX570900	EX57W05X	EX57W05X EX57W10X	EX57W02X	EX57W17X		MAX	95%	
SAMPLE LOCATION	57B-95-08X	57B-95-09X				The state of the s	AVERAGE,	DETECT	TON	EPC ²
ANALYTES										***
									A CONTRACTOR AND AND AND AND AND AND AND AND AND AND	A comment of the comm
TPH (mg/Kg) ³	20	36	2	Q	2	QN	A/N	N/A	N/A	N/A
VPH RANGES (mg/Kg)*										
C5 - C8 Aliphatics	2	Q	2	9	9	9	ΝΆ	N/A	N/A	N/A
C9 - C12 Aliphatics	1.7	1.3	2.35	1.92	2.68	16	4.33	16	NC	16
C9 - C10 Aromatics	0.7	0.55	2.35	1.92	4.85	2	2.06	4.85	NC	4.85
				Production of the Control of the Con	Control of the Contro			V 107		
EPH RANGES (mg/Kg)*	The second secon	And the state of t		" with a distribution and the contract of the second section and the contract of the contract	Proposition and annual contraction of	Character - Commercial de maior des constitues de constitu		Control Contro		THE RESERVE THE PROPERTY OF PROPERTY OF THE PR
C9 - C18 Aliphatics	3.2	2.5	3.2	3.48	3.63	1.8	2.97	3.63	NC	3.63
C19 -C36 Aliphatics	38	30	3.2	3.48	7.28	2.4	41	38	S	38
C11 - C22 Aromatics	6.2	4.9	8.5	3.48	9.75	9.5	7.06	9.75	S	9.75

OTES:

TPH = Total Petroleum Hydrocarbons

VPH = Volatile Petroleum Hydrocarbons

EPH = Extractable Petroleum Hydrocarbons

ND = No data

mg/Kg = milligrams per kilograms

ULC = The 95% upper confidence limit of the airthmetic mean.

EPC = Exposure point concentration

N/A = Not applicable

NC = Not calculated because there are fewer than 10 samples.

The average represents the arithmetic mean of all the sample results, with one-half the detection limit used for non-detects.

² THE EPC is the lesser of the maximum detected concentration and the 95% UCL.

3 The EPC for TPH is not calculated because petroleum hydrocarbon fractions are evaluated instead of TPH.

EXPOSURE POINT CONCENTRATIONS PETROLEUM HYDROCARBONS IN SUBSURFACE SOIL AREA 3 INDUSTRIAL AOC 57 RI

SAMPLE ID	BX570805	BX570905	BX570805 BX570905 BX571110	EX57W06X I	EX57W06X EX57W07X EX57W08X EX57W09X EX57F01X EX57F02X	X57W08X E.	X57W09X	EX57F01X E	X57F02X		MAX	%56	
SAMPLE LOCATION	57B-96-08X	57B-96-09X 57	57B-96-08X 57B-96-09X 57B-96-11X (+dup)						AVERAGE ¹	DETECT	占 기	EPC^2
ANALYTES	Transfer to the contract and the contract and the		THE ALL PART STREET TO THE THE THE WARRIES TO	3 3 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4				matrial debadaga (portages a rest), mortag activa in	de a constituent describer and a constituent	The state of the s			
TPH (mg/Kg)³	14*	14*	25	2	Q	QN	8	Q	2	N/A	N/A	Ą. V	N/A
VPH RANGES (mg/Kg)*													
C5 - C8 Aliphatics	₽	Ş	£	2	2	2	₽	2	2	Ϋ́	K/A	N/A	V/N
C9 - C12 Aliphatics	0.47	0.47	0.84	2.3	2.25	2.25	1.85	2.3	2.3	1.67	2.3	SC	2.3
C9 - C10 Aromatics	0.19	0.19	0.35	2.3	2.25	2.25	1.85	2.3	2.3	1.55	2.3	သူ	2.3
EPH RANGES (mg/Kg)*													1 11 1
C9 - C18 Aliphatics	6.0	6.0	1.6	3.2	6	3.15	3.15	7.8	3.8	12	7.8	S	7.8
C19 -C36 Aliphatics	-	-	19	20	440	10	3.15	066	12	168	066	S	066
C11 - C22 Aromatics	1.7	1.7	3.1	8.5	37	8.5	8.5	110	10	21	110	NC	110

This value represents 1/2 the non-detect value.

TPH ≠ Total Petroleum Hydrocarbons

VPH = Volatile Petroleum Hydrocarbons EPH = Extractable Petroleum Hydrocarbons

ND ≖ No data

mg/Kg = milligrams per kilograms

ULC = The 95% upper confidence limit of the airthmetic mean. EPC = Exposure point concentration N/A = Not applicable

NC = Not calculated because there are fewer than 10 samples.

1 The average represents the arithmetic mean of all the sample results, with one-half the detection limit used for non-detects.

² THE EPC is the lesser of the maximum detected concentration and the 95% UCL.

³ The EPC for TPH is not calculated because petroleum hydrocarbon fractions are evaluated instead of TPH.



EXPOSURE POINT CONCENTRATIONS PETROLEUM HYDROCARBONS IN SURFACE SOIL AREA 3 RECREATIONAL AOC 57 RI

SF571401 EX5703X EX57W14X EX57	EX57W15X EX57W16X		MAX	95%	
<u> </u>		AVERAGE ¹	DETECT	NCL	EPC^2
N	ON ON	N/A	N/A	N/A	N/A
	THE PROPERTY OF THE PARTY OF TH				
QN QN		ΑM	ΑΝ	N/A	ΝΑ
0.7 47 110 2.	2.85 1500	277	1500	2	1500
37 55		116	009	ပ္က	009
dad dhadan ar belandahan ar an estan damah dahalifana estat bis esta antimetricka emande estat suddanddannan	e sa como como como como como como como com	The same of the sa			Bernader a conduction
3.75 920	ļ	505	1300	2	1300
150 3.75 20,000 72	7200 8600	6020	20,000	ပ္င	20,000
10 3100		974	3100	NC	3100
10 3100	-	ا	\dashv	974	974 3100

OTES

TPH = Total Petroleum Hydrocarbons

VPH = Volatile Petroleum Hydrocarbons

EPH = Extractable Petroleum Hydrocarbons

ND = No data

mg/Kg = milligrams per kilograms

ULC = The 95% upper confidence limit of the airthmetic mean.

EPC = Exposure point concentration

N/A = Not applicable

NC = Not calculated because there are fewer than 10 samples.

1 The average represents the arithmetic mean of all the sample results, with one-half the detection limit used for non-detects.

² THE EPC is the lesser of the maximum detected concentration and the 95% UCL.

3 The EPC for TPH is not calculated because petroleum hydrocarbon fractions are evaluated instead of TPH.

N-3 SOIL ADHERENCE FACTOR CALCULATONS

Table N-3
Calculation of Soil Adherence Factors

Receptor	Representative		Soil Ad	Soil Adherence (mg/cm2)	1/cm2) 1		Surface Area-	Total Surface
	Scenario 1	Hands	Arms	Legs	Faces	Feet	Weighted AF (mg/cm²) 2	Area (cm²) ²
Adult Excavation Worker	Construction/Utility/ Equipment ⁵	0.32	0.3	0.066	0.23	Y Y	0.29	5200
Adult Commercial Worker	Groundskeepers ⁶	0.098	0.022	0.001	0.01	0.018	0.016	12731
Adult Maintenance Worker / Groundskeeper	Irrigation Installers	0.19	0.018	0.0054	0.0063	N V	0.024	11600
Child Resident	USEPA, 1998 ⁷						<u>~</u>	2045
Recreational Visitor (6 thru 16)	(8)						Υ-	3850
Adult Resident	USEPA, 1998 ⁷						0.08	2800
Body Surface Areas (cm²) 3		Hands	Arms	Legs	Faces	Feet	Total Surface Area	
Adult Child (ages 6 -16)	١	990	2910 1752	6400 4035	1300 910	1131 989	12731 8373	

dofes.

- 1 Kissel, J.; Richter, K.; Fenske, R. (1996). Field measurements of dermal soil loading attributable to various activities: Implications for Exposure Assessment.
 - Risk Anal. 16(1):115-125. Data excerpted from the Exposure Factors Handbook (USEPA, 1997. EPA\600\RP-95\0002F)
- 2 Calculated as: Sum[(SAi...SAn x AFI...AFn) / Sum (SAi...SAn), where AF is AF presented in scenario, and SA is for body part associated with AF measurement
- 3 From Exposure Factors Handbook (USEPA, 1997). All values are 50% percentile values for males. Values for children are averages for the age periods included in receptor scenario.
- 4 AF values for this scenario are higher than AF values for Gardners No. 2
- 5 For each body part, the highest dermal loading value among construction worker, utility worker, and equipment operator scenarios is selected.

The dermal loading for legs was not included because dermal loading was only measured (soil was only present) on legs in one scenario.

- 6 For each body part, the highest dermal loading value among Groundskeepers Nos. 2 through 5 is selected; values for Groundskeepers No. 1 are not used because the measurements are based on only 2 persons.
- 7 Values recommended for residential exposures in Supplemental Guidance to RAGS Dermal Exposure Assessment (USEPA, 1998)
 - 8 Assumes adherence factor for child resident (USEPA, 1998). Surface area is for arms, lower legs, and hands.

N-4 TOXICITY PROFILES

C:\FDRITABL\57\APPCOVER 9144-03

1,2-Dichloroethene. 1,2-Dichloroethene is a volatile organic compound which exists as cis- and trans-isomers. The commercially used material is usually a mixture of the two isomers. In the past, it was used as a general inhalation anesthetic. It is currently used as an extraction solvent or as a component of dyes, perfume oils, waxes, resins, and plastics. It is also used as an intermediate in the synthesis of polymers.

1,2-Dichloroethene is absorbed by all routes of administration. Distribution is rapid and, due to its lipophilic nature, occurs to all organ systems. It is extensively metabolized to dichloroacetaldehyde and chloroacetic acids which are excreted primarily through urine.

Dermal contact to 1,2-dichloroethene may result in defatting of the skin and dermatitis. Exposure to airborne 1,2-dichloroethene causes irritation to eyes, mucous membranes and the upper respiratory tract. Systemically, the transisomer is believed to be more toxic than the cis-isomer. However, both have been reported to produce central nervous system depression and toxicity to liver and lungs. No data on the reproductive toxicity of 1,2-dichloroethene exists. Both isomers have tested negative for mutagenicity in vitro tests. Cancer effects have not been studied in humans or animals.

References:

Agency for Toxic Substances and Disease Registry (ATSDR), 1990. "Toxicological Profile for 1,2-Dichloroethene"; Agency for Toxic Substances and Disease Registry, U.S. Public Health Service, February 1990.

Mycroft, F.J., Jones, J.R., and Olson, K.R. 1990. Environmental and Occupational Toxicology. In: Poisoning and Drug Overdose. Ed. K.R. Olson. Appleton & Lange, CT. p. 397.

1,2/1,4-Dichlorobenzene. 1,4-Dichlorobenzene has been used as mothballs, an insecticidal furnigant, a germicide, and a space deodorant. Human exposure to 1,4-dichlorobenzene has produced irritation to skin, throat, and eyes; prolonged exposure to high concentrations may cause weakness, dizziness, loss of weight, or liver injury. In several studies involving female rats and mice, no overt signs of toxicity were apparent at any exposure level. Non-tumor and tumor pathology did not indicate any treatment related effect of either species. An embryotoxicity and teratology study on rats did not demonstrate any signs of embryo- or phytotoxicity or teratogenicity at any exposure level (Loeser, 1983). In a series of mutagenicity tests, 1,4-dichlorobenzene did not produce a mutagenic response. (Loeser, 1983). Other exposure studies in rats have produced developmental abnormalities, phytotoxicity, and kidney tumors. Additional exposure studies in animals have produced histological changes in the lung, cirrhosis and necrosis of the liver, swelling of the tubular epithelium of the kidneys. 1,4-dichlorobenzene has been classified by the USEPA as a group C carcinogen, possibly carcinogenic to humans.

References:

Heath Effects Summary Tables (HEAST), 1993. United States Environmental Protection Agency.

Loeser E, Litchfield MH; Food Chem Toxicol 21 (6): 825-32 (1983)

Aluminum. Aluminum occurs naturally in the soil and makes up approximately 8 percent of the earths crust. Higher soil concentrations are associated with industries which burn coal and aluminum mining and smelting. Human exposures to aluminum may occur through ingestion of foods grown in soil that contains aluminum and use of antacids, antiperspirants, and other drug store items. Aluminum in antiperspirants can cause skin rashes in some people. Factory workers who inhale large amounts of aluminum dust may develop lung problems. Aluminum has caused lower birth weights in some animals. Studies have shown that aluminum accumulates in the brains of people with Alzheimer's disease. However, any causal link between aluminum exposure and this disease is yet to be demonstrated. Both human epidemiological studies and animal experiments strongly suggests that aluminum is not a carcinogen.

References:

Agency for Toxic Substances and Disease Registry (ATSDR), 1989. "Toxicological Profile for Aluminum"; Agency for Toxic Substances and Disease Registry, U.S. Public Health Service, October 1989.

Antimony. Antimony enters the environment during the mining and processing of its ores and other related compounds. Small amounts of antimony are also released into the environment by incinerators and coal burning power plants. Antimony will strongly adhere to soil which contains iron, manganese, or aluminum. Antimony was used for medicinal purposes to treat people infected with parasites. However, chronic exposure can cause eye, skin, and lung irritation, as well as heart problems, vomiting and diarrhea. The oral RfD, based on an oral drinking water study in rats, showed changes in glucose and cholesterol metabolism. Antimony has not been evaluated by the USEPA for evidence of human carcinogenic potential.

References:

Agency for Toxic Substances and Disease Registry (ATSDR), 1991. "Toxicological Profile for Antimony"; Agency for Toxic Substances and Disease Registry, U.S. Public Health Service, February 1991.

Integrated Risk Information System (IRIS), 1993. United States Environmental Protection Agency.

Aroclors. Aroclors (polychlorinated biphenyls [PCBs]) are organic compounds composed of two chlorinated aromatic rings. The amount of chlorination of the rings determines the specific structure, or congener, of the aroclor and, subsequently, the specific chemical, physical, and toxicological properties. The excellent dielectric properties, thermal stability, and nonflamability of aroclors has made them ideal for use in electrical transformers and capacitors. Therefore, they have been used in these applications extensively in the past. Humans may be exposed to aroclors when an aroclor-containing electrical component burns or is dismantled. Although the production of aroclors in the U.S. was banned in 1977, aroclors do not readily breakdown, and they may still be present in older electrical equipment, and environmental media.

Following dermal exposure, aroclors have caused a skin rash called chloracne. Aroclors have also produced developmental defects in humans, which have mainly consisted of behavioral abnormalities. These effects have also been observed in animals. Epidemiological studies on occupationally-exposed humans do not conclusively link exposure to aroclors with an increased incidence of cancer. However, chronic oral exposure to aroclors has produced liver cancer in laboratory animals. The potency of the carcinogenic action of aroclors appears to increase as the chlorination of the aroclors increases. Although cancer in laboratory animals has only been conclusively demonstrated for aroclors with the highest percent chlorination (aroclors-1260 and 1254), the USEPA has classified all aroclor congeners as B2, probable human carcinogens.

References:

MADEP, 1992. "Risk Assessment Shortform Residential Exposure Scenario, Version 1.6"; Policy #WSC/ORS-142-92; Office of Research and Standards and the Bureau of Waste Site Cleanup, Boston, MA; September 1992.

Arsenic. Arsenic has been used in pesticide formulations and has industrial uses in tanneries, as well as the glass and wine making industries. Toxicity depends on its chemical form. Arsenic is an irritant of the skin, mucous membranes, and gastrointestinal tract. Symptoms of acute toxicity include vomiting, diarrhea, convulsions, and a severe drop in blood pressure. Subchronic effects include hyperpigmentation, sensory-motor polyneuropathy, persistent headache, and lethargy. Chronic oral exposure has caused skin lesions, peripheral vascular disease, and peripheral neuropathy. The USEPA has classified arsenic in Group A, human carcinogen, based on increased incidence of lung cancer in occupational studies.

References:

Agency for Toxic Substances and Disease Registry (ATSDR), 1992. "Toxicological Profile for Arsenic"; Agency for Toxic Substances and Disease Registry, U.S. Public Health Service, February 1992.

Barium. Barium is used in paints, soap, paper, rubber, and in the manufacture of glass. Some compounds of barium have been used as insecticides. Acute exposure to barium through ingestion can cause gastroenteritis, muscular paralysis, as well as cardiovascular effects. Chronic inhalation of barium containing dust can cause a reversible, benign pneumoconiosis. There is no evidence for carcinogenicity for barium.

References:

Amdur, Mary O., John Doull, Curtis D. Klaassen, 1991. <u>Toxicology: The Basic Science of Poisons</u>, 4th edition; Pergamon Press, Inc. New York.

Benzo(k)fluoranthene. Benzo(k)fluoranthene is a member of the polycyclic aromatic hydrocarbons (PAH) class of compounds which contain two or more aromatic rings. PAHs are ubiquitous in nature and are also manmade. Benzo(k)fluoranthene occurs naturally in coal tar, crude oil, and is formed from incomplete combustion of organic material.

Although there are no human data that specifically link exposure to benzo(k)fluoranthene to human cancers, benzo(k)fluoranthene is a component of mixtures that have been associated with human cancer. These include coal tar, soots, coke oven emissions and cigarette smoke. Benzo(k)fluoranthene produced tumors after lung implantation in mice and when administered with a promoting agent in skin-painting studies. Benzo(k)fluoranthene is mutagenic in bacteria. Benzo(k)fluoranthene has been classified by USEPA as a B2, probable human carcinogen.

References:

MADEP, 1992. "Risk Assessment Shortform Residential Exposure Scenario, Version 1.6"; Policy #WSC/ORS-142-92; Office of Research and Standards and the Bureau of Waste Site Cleanup, Boston, MA; September 1992.

Bis(2-ethylhexyl)phthalate (DEHP). DEHP is used industrially as a plasticizer for resins and is found in many plastic materials as it makes them more flexible. It is also used in manufacturing organic pump fluids in electrical capacitors. Acute exposure to DEHP has produced eye and mucous membrane irritation, nausea, and diarrhea. Chronic exposure of laboratory animals to DEHP indicate that the target organs are the liver, causing morphological and biochemical changes, as well as the testes, producing damage to the seminiferous tubules. DEHP has produced developmental and reproductive effects in laboratory animals including spina bifida and reduced fertility. DEHP has been shown to cause a dose-related increase in liver tumors in mice and rats. Thus, the USEPA has designated DEHP as a B2, probable human carcinogen.

References:

ATSDR, 1991. Toxicological Profile for Di(2-ethylhexyl)phthalate. Agency for Toxic Substances and Disease Registry, U.S. Public Health Service, October, 1991.

<u>Cadmium</u>. Cadmium is commonly used in electroplating and galvanizing due to its non-corrosive properties. It is a local respiratory tract irritant following exposure to cadmium dust or fumes. Acute exposure to cadmium dust/fumes may produce an acute chemical pneumonitis. Acute, oral exposure to cadmium results in nausea, vomiting, salivation, abdominal pain, cramps, and diarrhea. Chronic exposure to cadmium results in osteomalacia and osteoporosis (Itai-Itai disease) secondary to renal damage. The USEPA has classified cadmium as a B1 carcinogen via inhalation based on epidemiological data from Japan and China.

References:

Amdur, Mary O., John Doull, Curtis D. Klaassen, 1991. <u>Toxicology: The Basic Science of Poisons</u>, 4th edition; Pergamon Press, Inc. New York.

Integrated Risk Information System (IRIS), 1993. United States Environmental Protection Agency.

Carbon Tetrachloride

Carbon tetrachloride is currently used as a fumigant, refrigerant, a propellant, and as a solvent for oil, fats, lacquers, varnishes, rubber, waxes, and resins. In the past, it was used as an industrial degreaser and a fire-extinguishing agent. Acute exposure is associated with dizziness, headache, confusion, and CNS depression. Liver and kidney damage result from chronic exposures. Symptoms of liver damage can include nausea, vomiting, enlarged and tender liver, jaundice, and fatty liver. Kidney failure, resulting in accumulation of waste products in the blood and water in the lungs is a

major cause of death from carbon tetrachloride. The liver and kidney have also been proven to be targets of toxicity in animals. Carbon tetrachloride has been designated as a B2, probable human carcinogen.

References:

Clayton, George D. and Florence E. Clayton, editors, 1981. <u>Patty's Industrial Hygiene and Toxicology</u>, 3rd Revised Edition; John Wiley & Sons; New York.

Integrated Risk Information System (IRIS), 1993. United States Environmental Protection Agency.

<u>Chloroform</u>. Originally used as a general anesthetic, chloroform is used now in the production of air conditioning coolant, as a solvent, and in the manufacture of pesticides and dyes. It can also be found in dry cleaning agents, plastics, and floor polishes, and as a by product of drinking water purification. Acute exposure to chloroform via inhalation produced dizziness and gastrointestinal upset. Dermal contact with chloroform produces burns. It is a CNS depressant and chronic exposure has been shown to cause liver and kidney toxicity as well as cardiac arrhythmias. Several studies indicate that chloroform is carcinogenic via the oral route causing liver carcinoma in mice and kidney tumors. The USEPA has designated chloroform as a B2 carcinogen, a probable human carcinogen.

References:

Amdur, Mary O., John Doull, Curtis D. Klaassen, 1991. <u>Toxicology: The Basic Science of Poisons</u>, 4th edition; Pergamon Press, Inc. New York.

Integrated Risk Information System (IRIS), 1993. United States Environmental Protection Agency.

Chromium. Chromium has been used in plating for corrosion resistance and decorative purposes, in the manufacture of alloys, and in printing, dying, and photography. The toxicity of chromium depends upon its valence state. Hexavalent chromium is more toxic via inhalation than trivalent chromium. The effects of inhalation exposure to hexavalent chromium include ulcers of the upper respiratory tract, nasal inflammation, perforation of the nasal septa and lung cancer. Most trivalent chromium compounds are inactive in short-term genotoxicity assays. Trivalent chromium compounds have not been found to be carcinogenic by any route of exposure. There is epidemiological evidence of an association between chromium and lung cancer. The USEPA has classified hexavalent chromium as an Class A, human carcinogen, by the inhalation route.

References:

Amdur, Mary O., John Doull, Curtis D. Klaassen, 1991. <u>Toxicology: The Basic Science of Poisons</u>, 4th edition; Pergamon Press, Inc. New York.

Integrated Risk Information System (IRIS), 1993. United States Environmental Protection Agency.

<u>Copper</u>. Copper is widely distributed in nature and is an essential element. Copper deficiency is characterized by anemia and is used for medicinal purposes as an emetic and an astringent. Acute exposure to copper ingestion causes vomiting, hematesis, hypotension, coma, and jaundice. Chronic exposure of children to elevated concentrations of copper causes liver cirrhosis. Copper is not believed to be a human carcinogen.

References:

Amdur, Mary O., John Doull, Curtis D. Klaassen, 1991. <u>Toxicology: The Basic Science of Poisons</u>, 4th edition; Pergamon Press, Inc. New York.

<u>Dieldrin</u>. Dieldrin is a man-made chlorinated insecticide that was widely used in agriculture, and for termite-proofing of wooden building material and residential dwellings, until it was banned for use in the U.S. in 1974. However, it is highly persistent in the environment and bioaccumulates in terrestrial and aquatic food chains. This, combined with extensive past use, has made dieldrin ubiquitous in the environment. Humans may be exposed to dieldrin from

consumption of animal and agricultural products exposed to contaminated soil and from exposure associated with the use of dieldrin as a termite-proofing agent.

Exposure to high levels of dieldrin has been associated with central nervous system excitation that resulted in convulsions, and renal toxicity. Long-term low-level exposure to dieldrin has also been associated with occasional cases of nervous system intoxication. In addition, hepatic degeneration, immunosuppression, and possible reproductive/developmental toxicity have been observed in laboratory animals exposed to dieldrin. Chronic oral exposure to dieldrin has produced liver cancer in laboratory mice and rats. Epidemiological investigations have been of insufficient quality to assess dieldrin carcinogenicity in humans. Based on animal data, the USEPA has placed dieldrin into group B2, probable human carcinogen.

References

Agency for Toxic Substances and Disease Registry (ATSDR), 1991. "Toxicological Profile for Aldrin/Dieldrin"; Agency for Toxic Substances and Disease Registry, U.S. Public Health Service, October 1991.

<u>Iron</u>. Iron is a metal which is required for a variety of physiological functions such as heme biosynthesis, oxidative phosphorylation and mixed-function oxidase-mediated metabolic reactions. Only divalent forms of iron are absorbed. As absorption occurs, divalent iron is biochemically converted to trivalent iron, the biologically active form. Under normal conditions, absorbed dietary iron is complexed to hemoglobin and transported to the liver for storage until needed for physiological reactions. The balance of iron is regulated only by the amount of dietary intake and the degree of intestinal absorption. Intestinal absorption tends to be low (2 - 15%) except during periods of increased iron need when absorption efficiency increases dramatically.

Acute iron toxicity has been well characterized following the accidental ingestion of iron-containing preparations by children. Shortly after ingestion, the corrosive effects of iron cause vomiting and diarrhea, often bloody. Later signs include shock, metabolic acidosis, seizures, liver and/or kidney failure, coma, and death. Chronic iron overload manifests as disturbances in liver function, diabetes mellitus, and endocrine and cardiovascular effects. Inhalation of iron containing dust or fumes in occupational settings may result in deposition of iron particles in the lungs leading to interstitial fibrosis. Autopsies of hematite miners noted an increase in lung cancer. However, the etiology of the lung cancer may be related to factors other than iron exposure such as cigarette, silica or PAH exposures.

References:

Aisen, P., Cohen, G. and Kang, J.O., 1990. Iron Toxicosis. Int. Rev. Exp. Pathol. 31:1-46.

Goyer, R.A., 1991. Toxic Effects of Metals. In: Casarett and Doull's Toxicology: The Basic Science of Poisons, 3rd edition. Eds. C.D. Klaassen, M.O. Amdur and J. Doull. Macmillan Publishing Co. N.Y.

<u>Lead</u>. Lead is used as a component in storage batteries and was widely used in gasoline and paints. It is the most ubiquitous toxic metal in the environment. The most serious effects of chronic exposure are encephalopathy, renal damage, and changes in the hematopoietic system, which is the most sensitive indicator of lead exposure. Peripheral nerve dysfunction is observed in adults at blood lead levels of 30 to 50 mg/dL-blood. The nervous systems of children are reported to be affected at levels of 15 mg/dL-blood (Benignus and others, 1981). Chronic lead exposure by workers through inhalation has resulted in statistically significant increases in tumors. Oral exposures of lead salts in animals has been shown to increase tumor formation.

References:

Amdur, Mary O., John Doull, Curtis D. Klaassen, 1991. <u>Toxicology: The Basic Science of Poisons</u>, 4th edition; Pergamon Press, Inc. New York.

Benignus, V.A., Otto, D.A., Muller, K.E., Seiple, K.J., 1981. "Effects of Age and Body Lead Burden on CNS Function in Young Children. II:EEG Spectra." <u>Electroencephalograph. Clin. Neurophysiol.</u> 52:240-248.

Manganese. Manganese is a naturally occurring substance found in many types of rock. It does not generally occur in the environment as the pure metal, rather, it is found combined with other chemicals such as sulfur, oxygen, and chlorine. Manganese is mixed with iron to make various types of steel. Manganese is a component of some ceramics, pesticides, fertilizers, and in nutritional supplements. In small doses manganese is beneficial to human health. Manganese miners and steel workers exposed to elevated concentrations of manganese have evidenced mental and emotional disturbances, and slow and clumsy body movements. Target organs of manganese are the lung and CNS. When inhaled, manganese dust can also cause lung irritation. EPA has classified manganese as a Class D, not classifiable as to human carcinogenicity.

References:

Agency for Toxic Substances and Disease Registry (ATSDR), 1991. "Toxicological Profile for Manganese"; Agency for Toxic Substances and Disease Registry, U.S. Public Health Service, February 1991.

<u>Naphthalene</u>. Naphthalene is a member of the polycyclic aromatic hydrocarbons (PAH) class of compounds which contain two or more aromatic rings. PAHs are ubiquitous in nature and are also manmade. Naphthalene occurs naturally in coal tar, crude oil, and is formed from incomplete combustion of organic material. It is also product of pyrolysis in tobacco smoke. Naphthalene is used for the production of phthalic anhydride, which is used for the production of plasticizers. Naphthalene is also used in moth balls, for the production of the insecticide carbaryl, and in numerous resins, dyes, pharmaceuticals, and other organic materials.

Naphthalene is absorbed through the inhalation, oral, and dermal routes, and appears to be more toxic to humans than laboratory animals. The principal toxic effect of naphthalene in humans and animals is hemolysis of red blood cells, which can lead to anemia, decreased oxygen carrying capacity, and jaundice. Humans pre-disposed to anemia, such as those with G6DP enzyme deficiency, may be particularly sensitive to naphthalene toxicity. Exposure to naphthalene has also been correlated with increased risk of cataract formation. Animal studies were negative for naphthalene reproductive toxicity. Although no human epidemiological data are available for assessing naphthalene carcinogenicity, animal data investigating naphthalene toxicity are equivocal. The USEPA has placed naphthalene in weight-of-evidence Group D, not classifiable as to human carcinogenicity.

References:

Agency for Toxic Substances and Disease Registry (ATSDR), 1990. "Toxicological Profile for Naphthalene"; Agency for Toxic Substances and Disease Registry, U.S. Public Health Service. October, 1990.

<u>Tetrachloroethene</u> (<u>Perchlorethene</u>). Tetrachloroethene is a man-made volatile chlorinated solvent that is used extensively in the textile and dry cleaning industries as a cleanser and degreaser. Tetrachloroethene is also used as a degreaser in the electronics and metal industry. Since tetrachloroethene effectively cleans and decreases without adversely affecting what is being cleansed, tetrachloroethene is used extensively in a multitude of commercially available cleansers.

Tetrachloroethene is nearly completely absorbed via the inhalation and oral routes; dermal exposure represents a minor pathway. Oral and inhalation exposure to tetrachloroethene in humans and animals indicates that the liver, kidney, and nervous system are target organs. Long-term exposures to tetrachloroethene produced proliferative changes in the mouse livers, renal nephropathy in animals and occupationally exposed workers, and irreversible nervous system damage in laboratory animals. Additionally, an increased incidence of menstrual disorders and spontaneous abortions have been observed in women occupationally exposed to tetrachloroethene in the dry cleaning business. Epidemiological data in humans is insufficient to make conclusions regarding the potential carcinogenicity of tetrachloroethene. However, tetrachloroethene has produced hepatic cancer in laboratory animals exposed orally and by inhalation. Therefore, the USEPA has placed tetrachloroethene in weight-of-evidence group B2, probable human carcinogen.

References: .

Agency for Toxic Substances and Disease Registry (ATSDR), 1991. "Toxicological Profile for Tetrachloroethene"; Agency for Toxic Substances and Disease Registry, U.S. Public Health Service. October, 1991.

<u>Trichloroethene</u>. Trichloroethene is a man-made chlorinated solvent that is used extensively in industry as a metal decreasing agent. Trichloroethene is also used in dry cleaning and as a solvent in paints and adhesives.

Several human deaths and acute neurotoxic effects have been attributed to oral and inhalation exposure to trichloroethene. In animals, oral and inhalation exposure to trichloroethene have produce neurotoxic effects, including behavioral changes, and renal toxicity. Additionally, inhalation and oral exposures to trichloroethene in animals have produced lung, liver, and testicular cancers. Epidemiological data in humans is insufficient to conclude whether trichloroethene is a human carcinogen. However, studies on trichloroethene metabolism suggest that it is metabolized similarly

in humans and laboratory animals. Therefore, the USEPA has place trichloroethene in weight-of-evidence group B2, probable human carcinogen.

References:

MADEP, 1992. "Risk Assessment Shortform Residential Exposure Scenario, Version 1.6"; Policy #WSC/ORS-142-92; Office of Research and Standards and the Bureau of Waste Site Cleanup, Boston, MA; September 1992.

<u>Vanadium</u>. Vanadium is widely, but sparsely, distributed in the earth's crust and in the environment. It is invaluable as an alloying agent with steel; ferrovanadium alloys are used in high-stress applications such as bearings, jet engines, and cutting tools. Human and animal studies indicate that vanadium is readily absorbed from the lungs and poorly absorbed from the gastrointestinal tract. It distributes primarily to the bone and kidney. Vanadium is a respiratory irritant. Inhalation of vanadium dusts in both animals and occupationally-exposed workers induces mild to moderate respiratory irritation. The effects are reversible and subside when exposure is discontinued. No studies were located regarding cancer in humans or animals following inhalation, oral, or dermal exposures. However, vanadium has been found to induce DNA damage in human cell cultures, suggesting that vanadium may have the potential to be genotoxic to humans.

References:

ATSDR, 1990. Toxicological Profile for Vanadium. Agency for Toxic Substances and Disease Registry, U.S. Public Health Service, October, 1990.

VPH/EPH FRACTIONS

Chemical surrogates were chosen to represent the different aliphatic and aromatic fractions of TPH. Appropriate surrogates are referenced below for each fraction.

C5-C8 Aliphatics. n-Hexane is the reference compound for the TPH fraction containing C5-C8 alkanes/cycloalkanes. Through epidemiological studies on n-hexane-exposed workers, sensorimotor polyneuropathy has been observed as the main toxic effect of long-term exposure. Other noted effects include cranial neuropathy, blurred vision, and abnormal color vision. The onset of symptoms may be delayed for several months to a year after exposure. Affected individuals may recover completely, but some may retain sensorimotor deficits. A number of animal studies have been conducted that document n-hexane's neuropathic effects.

Reference:

MADEP, 1994. Interim Final Petroleum Report: Development of Health-Based Alternative to the Total Petroleum Hydrocarbon (TPH) Parameter. August.

C9-C12 Aliphatics. See profile for n-Hexane provided for C5-C8 Aliphatics above.

C9-C18 Aliphatics. See profile for n-Hexane provided for C5-C8 Aliphatics above.

C19-C36 Aliphatics. See profile for n-Hexane provided for C5-C8 Aliphatics above.

C9-C10 Aromatics. See profile for pyrene and profile for xylene below.

Xylenes. Xylene is a volatile organic compound that is generally composed of a mixture of the meta, ortho, and para isomers. Xylenes are used as solvents, in paints, thinners, cleaners, degreasers, and as a component in gasoline.

Xylenes are absorbed by oral, inhalation, and dermal exposures, and distribute to all tissues, particularly those with high fat contents. All three isomers produce similar effects, although the potency with which various effects are produced may vary from effect to effect with each isomer. In both humans and animals, xylene exposure has been associated with central nervous system depression, impaired learning and memory, and tremors. In humans, inhalation of xylene may produce prolonged respiratory tract inflammation and edema. In laboratory animals, exposures to xylenes have produced adverse reproductive effects, including increased fetal death rate and retarded development. There is no evidence of carcinogenicity in humans or animals.

References:

MADEP, 1992. "Risk Assessment Shortform Residential Exposure Scenario, Version 1.6"; Policy #WSC/ORS-142-92; Office of Research and Standards and the Bureau of Waste Site Cleanup, Boston, MA; September 1992.

C10-C22 Aromatics. See profiles for naphthalene and pyrene.

Naphthalene. Naphthalene is a member of the polycyclic aromatic hydrocarbon (PAH) class of compounds, which contain two or more aromatic rings. PAHs are ubiquitous in nature and are also man-made. Naphthalene occurs naturally in coal tar, crude oil, and is formed from incomplete combustion of organic material. It is also product of pyrolysis in tobacco smoke. Naphthalene is used for the production of phthalic anhydride, which is used for the production of plasticizers. Naphthalene is also used in moth balls, for the production of the insecticide carbaryl, and in numerous resins, dyes, pharmaceuticals, and other organic materials.

Naphthalene is absorbed through the inhalation, oral, and dermal routes, and appears to be more toxic to humans than laboratory animals. The principal toxic effect of naphthalene in humans and animals is hemolysis of red blood cells, which can lead to anemia, decreased oxygen-carrying capacity, and jaundice. Humans pre-disposed to anemia, such as those with G6DP enzyme deficiency, may be particularly sensitive to naphthalene toxicity. Exposure to naphthalene has also been correlated with increased risk of cataract formation. Animal studies were negative for naphthalene reproductive toxicity. Although no human epidemiological data are available for assessing naphthalene carcinogenicity, animal data investigating naphthalene toxicity are equivocal. The USEPA has placed naphthalene in weight-of-evidence Group D, not classifiable as to human carcinogenicity.

References:

Agency for Toxic Substances and Disease Registry (ATSDR), 1990. "Toxicological Profile for Naphthalene"; Agency for Toxic Substances and Disease Registry, U.S. Public Health Service. October, 1990.

Pyrene. Pyrene is a member of the polycyclic aromatic hydrocarbons (PAH) class of compounds which contain two or more aromatic rings. They are ubiquitous in nature and are also man made. It occurs naturally in coal tar, crude oil, and is formed from incomplete combustion of organic material. Pyrene is reported to be a skin irritant to humans. Rats administered pyrene exhibited blood chemistry changes, as well as liver and kidney damage. Pyrene was shown to be inactive as an initiating agent and thus has been classified as a D carcinogen.

References:

ATSDR, 1989. Toxicological Profile for Polycyclic Aromatic Hydrocarbons. Agency for Toxic Substances and Disease Registry, U.S. Public Health Service, October, 1989.

N-5 RISK CALCULATIONS

KIN-SS2I

INCIDENTAL INGESTION OF AND DERMAL CONTACT WITH SURFACE SOIL - RME CURRENT/FUTURE MAINTENANCE WORKER
AOC 57 AREA 2 INDUSTRIAL
FORT DEVENS, MA

14-Mar-00

August 1992

EXPOSURE PARAMETERS

EQUATIONS

CONCENTRATION SOIL CS See Below* mg/kg CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR (mg/kg-day) and mg/day INGESTION RATE IR 100% mg/day HAZARD QUOTIENT = INTAKE (mg/kg-day) / REFERENCE DOSE (mg/kg-day) and mg/day SOIL ADBERENCE FACTOR SAF 0.024 mg/day HAZARD QUOTIENT = INTAKE (mg/kg-day) / REFERENCE DOSE (mg/kg-da	PARAMETER	SYMBOL.	VALUE	UNITS		
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100% 0.024 mg/cm² 11,600 cm² 0.000001 kg/mg 70 kg 52 days/year 25 years 70 years 70 years 70 years 6md Volume I: nt, 1998.	INGESTION RATE	R	001	mg/day		
0.024 mg/cm² INTAKE = (INTAKE-INGESTION = 16.0000001 kg/mg	FRACTION INGESTED	E	100%		HAZARD QUOTIENT = INI	fAKE (mg/kg-day) / REFERENCE DOSE (mg/kg-day)
11,600 cm² INTAKE=INGES' 0,000001 kg/mg Ng/mg NTAKE-INGESTION = 52 days/year No years NTAKE-DERMAL = 70 years INTAKE-DERMAL = 100 years Intake-DERMAL	SOIL ADHERENCE FACTOR	SAF	0.024	mg/cm²		
0.000001 kg/mg INTAKE-INGESTION = 52 days/year 25 years INTAKE-DERMAL = 70 years anical-specific unitless fund Volume I: 1998.	SURFACE AREA EXPOSED	SA	11,600	cm ²	INTAKE = (INTAKE-INGES	STION) + (INTAKE-DERMAL)
NTAKE-INGESTION = 10 kg INTAKE-INGESTION = 25 years NTAKE-DERMAL = 70 years years years	CONVERSION FACTOR	స్	0.000001	kg/mg		
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incal-specific unitless INTAKE-DERMAL = 25 years incal-specific unitless fund Volume I: int, 1998.	EXPOSURE DURATION	ED	25	years		
70 years 25 years rical-specific unitless fund Volume I: nt, 1998.	AVERAGING TIME				INTAKE-DERMAL =	CS x SA x SAF x AE x CF x EF x ED
25 nical-specific fund Volume I: nt, 1998.	CANCER	AT	02	years		BW x AT x 365 days/yr
nical-specific fund Volume I: nt, 1998.	NONCANCER	AT	25	years		
Notes: For noncarcinogenic effects: AT = ED The dermal absorption efficiency is from the Risk Assessment Guidance for Superfund Volume I: Hurnan Health Evaluation Manual Supplemental Guidance Dermal Risk Assessment, 1998. *The lesser of the 55 % upper confidence limit (UCL) & maximum concentration. The caposure frequency is assumed to be 1 day a week from May 1st to Ocober 31st.	DERMAL ABSORPTION	AE	Chemical-specific	unitless		
Notes: For noncarcinogenic effects: AT = ED The dermal absorption efficiency is from the Risk Assessment Guidance for Superfund Volume I: Hurnan Health Evaluation Manual Supplemental Guidance Dermal Risk Assessment, 1998. *The lesser of the 55 % upper confidence limit (UCL) & maximum concentration. The caposure frequency is assumed to be 1 day a week from May 1st to Ocober 31st.	EFFICIENCY					
For noncarcinogenic effects: AT = ED The dermal absorption efficiency is from the Risk Assessment Guidance for Superfund Volume I: Hurnan Health Evaluation Manual Supplemental Guidance Dermal Risk Assessment, 1998. *The lesser of the 59 % upper confidence limit (UCL) & maximum concentration. The caposure frequency is assumed to be 1 day a week from May 1st to Ocober 31st.	Notes:					
The dermal absorption efficiency is from the Risk Assessment Guidance for Superfund Volume I. Human Health Evaluation Manual Supplemental Guidance Dermal Risk Assessment, 1998. *The lesser of the 95 % upper confidence limit (UCL) & maximum concentration. The exposure frequency is assumed to be 1 day a week from May 1st to Ocober 31st.	For noncarcinogenic effects: AT = ED					
Human Health Evaluation Manual Supplemental Guidance Dermal Risk Assessment, 1998. *The lesser of the 95 % upper confidence limit (UCL) & maximum concentration. The exposure frequency is assumed to be 1 day a week from May 1st to Ocober 31st.	The dermal absorption efficiency is from the R.	tisk Assessment Guidance	for Superfund Volume I:			
*The lesser of the 95 % upper confidence limit (UCL) & maximum concentration. The exposure frequency is assumed to be 1 day a week from May 1st to Ocober 31st.	Human Health Evaluation Manual Supplement	tal Guidance Dermal Risk	Assessment, 1998.			
The exposure frequency is assumed to be 1 day a week from May 1st to Ocober 31st.	*The lesser of the 95 % upper confidence limit	it (UCL) & maximum conc	entration.			
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MAIN-SS2I INCIDENTAL INGESTION OF AND DERMAL CONTACT WITH SURFACE SOIL - RME CURRENT/FUTURE MAINTENANCE WORKER AOC 57 AREA 2 INDUSTRIAL FORT DEVENS, MA

CARCINOGENIC EFFECTS

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1.6E-04		2.7E-02	3.0E-02 2.7E-02		3.0E-02	2.2E-06 3.0E-02	0.17 2.2E-06 3.0E-02
1.6E-04		5.5E-01	6.0E-01 5.5E-0	4.5E-05 6.0E-01	4.5E-05 6.0E-01	4.5E-05 6.0E-01	0.17 4.5E-05 6.0E-01
1.9E-04	_	5.5E+00	6.0E+00 5.5E+0		00+30'9	5.5E-04 6.0E+00	0.17 5.5E-04 6.0E+00
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MAIN-SS2I INHALATION EXPOSURE TO PARTICULATES IN SURFACE SOIL - RME CURRENT/FUTURE MAINTENANCE WORKER AOC 57 AREA 2 INDUSTRIAL FORT DEVENS, MA

EXPOSURE PARAMETERS

EQUATIONS

	CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR (mg/kg-day)+1		HAZARD QUOTIENT = INTAKE (mg/kg-day) / REFERENCE CONCENTRATION (mg/kg-day)			INTAKE - INHALATION = $(CAp + Cav) \times RAF \times InR \times ET \times EE$	BW x AT x 365 days/yr			AIR CONCENTRATION PARTICULATES = CS x 1/PEF		AIR CONCENTRATION VOLATILES = $CS \times 1/VF$	(VF not calculated because there are no VOCs selected as CPCs).					
UNITS	mg/kg C	mg/m³		m²/kg	ug/m³		kg	hours/day	days/year	years		A	years	years				
VALUE	See below	Calculated	Calculated	Calculated	1.32E+09	1.6	70	80	25	25	100 %		70	25	naximum concentration			
SYMBOL	S	CAp	CAv	VF	PEF	IhR	BW	ET	EF	B	RAF		AT	AT	nnfidence limit (UCL) & r	concern.		
PARAMETER	CONCENTRATION SOIL*	CONCENTRATION AIR PARTICULATES	CONCENTRATION AIR VOLATILES	VOLATILIZATION FACTOR**	PARTICULATE EMISSIONS FACTOR	INHALATION RATE	BODY WEIGHT	EXPOSURE TIME	EXPOSURE FREQUENCY	EXPOSURE DURATION	RELATIVE ABSORPTION FACTOR	AVERAGING TIME	CANCER	NONCANCER	Notes: * Soil concentration used is the lesser of the 95 % upper confidence limit (UCL) & maximum concentration	**Volatilization factor used only for volatile chemicals of potential concern.	For noncarcinogenic effects: AT = ED	ND = Value not determined



MAIN-SS2I INHALATION EXPOSURE TO PARTICULATES IN SURFACE SOIL - RME CURRENT/FUTURE MAINTENANCE WORKER AOC 57 AREA 2 INDUSTRIAL FORT DEVENS, MA

CARCINOGENIC EFFECTS

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COMPOUND	SOIL CONCENTRATION (mg/kg)	V.R (m*7kg)	AIR CONCENTRATION VOLATILES FARTICY (mg/m²) (ng/m²)	n.")	INITAKE (ng/kg·day)	REFERENCE DOSE (Ing/kg-day)	HAZARD	PERCENT TOTAL RISK
Arsenic	21	AN		1.6E-08	4.1E-10	QN		
Chronium	27			2.0E-08	5.3E-10	2.9E-05	1.8E-05	2.63%
Iron	16,400	AN		1.2E-05	3.2E-07	Q		
Manganese	481	NA		3.6E-07	9.5E-09	1.4E-05	6.8E-04	97.11%
<u>HAN</u>								
C9-C12 Aliphatics	32	NA		2.4E-08	6.3E-10	5.7E-01	1.1E-09	0.00016%
C9-C10 Aromatics	23	AN.		1.7E-08	4.5E-10	1.7E-02	2.7E-08	0.0038%
ЕРН								
C9-C18 Aliphatics	465	Y.		3.5E-07	9.2E-09	5.7E-01	1.6E-08	0.0023%
C19-C36 Aliphatics	5680	AN		4.3E-06	1.1E-07	QN		
C11-C22 Aromatics	1,770	Y Y		1.3E-06	3.5E-08	2.0E-02	1.7E-06	0.25%
					SUMMARY	SUMMARY HAZARD INDEX	0.0007	

WATH-SS2I(CT)

INCIDENTAL INGESTION OF AND DERMAL CONTACT WITH SURFACE SOIL - CENTRAL TENDENCY CURRENT/FUTURE MAINTENANCE WORKER
AOC 57 AREA 2 INDUSTRIAL
FORT DEVENS, MA

14-Mar-00

EXPOSURE PARAMETERS

EQUATIONS

是10日日 10日 10日 10日 10日 10日 10日 10日 10日 10日	Corre				
KARAMETER	DEMON	VALUE:	CHARLS		
CONCENTRATION SOIL	೪	See Below*	mg/kg	CANCER RISK = INTAKE (mg	CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR (mg/kg-day)-1
INGESTION RATE	Ħ	25	mg/day		
FRACTION INGESTED	臣	%001		HAZARD QUOTIENT = INTAI	HAZARD QUOTIENT = INTAKE (mg/kg-day) / REFERENCE DOSE (mg/kg-day)
SOIL ADHERENCE FACTOR	SAF	0.024	mg/cm²		
SURFACE AREA EXPOSED	SA	11,600	cm²	INTAKE = (INTAKE-INGESTION) + (INTAKE-DERMAL)	ION) + (INTAKE-DERMAL)
CONVERSION FACTOR	స్	0.00000	kg/mg		
BODY WEIGHT	BW	70	kg	INTAKE-INGESTION =	CS x IR x F1 x CF x EF x ED
EXPOSURE FREQUENCY	EF	26	days/year		BW x AT x 365 days/yr
EXPOSURE DURATION	æ	9.9	years		
AVERAGING TIME				INTAKE-DERMAL = C	CS x SA x SAF x AE x CF x EF x ED
CANCER	AT	70	years		BW x AT x 365 days/yr
NONCANCER	ΑT	9.9	years		
DERMAL ABSORPTION	AE	Chemical-specific	unitless		
EFFICIENCY					
Notes:					
For noncarcinogenic effects: AT = ED					
The dermal absorption efficiency is from the Risk Assessment Guidance for Superfund Volume I:	isk Assessment Guidance	for Superfund Volume I:			
Human Health Evaluation Manual Supplemental Guidance Dermal Risk Assessment, 1998.	al Guidance Dermal Risk	Assessment, 1998.			
*The lesser of the 95 % upper confidence limit (UCL) & maximum concentration.	t (UCL) & maximum conc	centration.			
The exposure frequency is assumed to be 1 day a week from May 1st to Ocober 31st.	y a week from May 1st to	Ocober 31st.			
ND =: Value not determined					

MAIN-SS2I(CT)
INCIDENTAL INGESTION OF AND DERMAL CONTACT WITH SURFACE SOIL - CENTRAL TENDENCY
CURRENT/FUTURE MAINTENANCE WORKER
AOC 57 AREA 2 INDUSTRIAL
FORT DEVENS, MA

CARCINOGENIC EFFECTS

PERCENT TOTAL RISK	100.00%	
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	Arsenic	

COMPOUND	CONCENTRATION (mg/kg)	(Agestion (Agestion	ABSORPTION EFFICIENCY	DERMAL (mg/kg-day)	ORAL (mg/kg-day)	RAL DERMAL kg-tay) (ng/kg-tay)	QUOTIENT	QUOTIENT DERMAL	HAZARD QUOTIENT	TOTAL RISK
Arsenic	21	1.1E-06	0.03	1.8E-07	3.0E-04	2.9E-04	3.6E-03	6.2E-04	4.2E-03	36.63%
Chromium	72	1.4E-06	QN		3.0E-03	QN	4.6E-04		4.6E-04	4.02%
Iron	16,400	8.3E-04	ΩN		QN	QN				
Manganese	481	2.4E-05	QN		7.1E-02	QN	3.4E-04		3.4E-04	3.02%
VPH					-				-	
C9-C12 Aliphatics	32	1.6E-06	0.17	1.5E-06	6.0E-01	S.5E-01	2.7E-06	2.8E-06	5.5E-06	
C9-C10 Aronatics	23	1.2E-06	0.17	1.1E-06	3.0E-02	2.7E-02	3.9E-05	4.1E-05	8.0E-05	0.70%
ЕРН									_	
C9-C18 Aliphatics	465	2.4E-05	0.17	2.2E-05	6.0E-01	5.5E-01	3.9E-05	4.1E-05	8.0E-05	0.70%
C19-C36 Aliphatics	2,680	2.9E-04	0.17	2.7E-04	6.0E+00	5.5E+00	4.8E-05	5.0E-05	9.8E-05	0.86%
C11-C22 Aromatics	1770	9.0E-05	0.17	8.5E-05	3.0E-02	2.7E-02	3.0E-03	3.2E-03	6.2E-03	54.02%



MAIN-SSZI(CT)
INHALATION EXPOSURE TO PARTICULATES IN SURFACE SOIL - CENTRAL TENDENCY
CURRENT/FUTURE MAINTENANCE WORKER
AOC 57 AREA 1 INDUSTRIAL
FORT DEVENS, MA

EXPOSURE PARAMETERS

EQUATIONS

	CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR (mg/kg-day)-1		HAZARD QUOTIENT = INTAKE (mg/kg-day) / REFERENCE CONCENTRATION (mg/kg-day)			INTAKE - INHALATION = $(C\Delta_D + C\alpha_V) \times RAF \times InR \times ET \times EE \times ED$	BW x AT x 365 days/yr			AIR CONCENTRATION PARTICULATES = CS x 1/PEF		AIR CONCENTRATION VOLATILES = CS x 1/VF	(VF not calculated because there are no VOC's selected as CPCs).					
UNITS	mg/kg CANCER RISK = INTAH	mg/m³	mg/m² HAZARD QUOTIENT =	m³/kg	ng/m³	m-/hour INTAKE - INHALATION	kg	hours/day	days/year	years AIR CONCENTRATION		AIR CONCENTRATION	years (VF not calculated becaus	years				
SYMBOL	CS See below	CAp Calculated	CAv Calculated	VF Calculated	PEF 1.32E+09	lhR 1.6	BW 70	ET .	EF 26	9:9 0:0	RAF 100%	-	AT 70	T 6.6	imit (UCL) & maximum concentration			
	J					**	a	a		<u>ш</u>	_		CANCER	NONCANCER	Notes: * Soil concentration used is the lesser of the 95 % upper confidence limit (UCL) &	**Volatilization factor used only for volatile chemicals of potential concern.	= ED	
PARAMETER	CONCENTRATION SOIL*	CONCENTRATION AIR PARTICULATES	CONCENTRATION AIR VOLATILES	VOLATILIZATION FACTOR**	PARTICULATE EMISSIONS FACTOR	INHALATION RATE	BODY WEIGHT	EXPOSURE TIME	EXPOSURE FREQUENCY	EXPOSURE DURATION	RELATIVE ABSORPTION FACTOR	AVERAGING TIME			Notes: * Soil concentration used	**Volatilization factor used only	For noncarcinogenic effects: AT = ED	ND = Value not determined

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MAIN-SS2I(CT)
INHALATION EXPOSURE TO PARTICULATES IN SURFACE SOIL - CENTRAL TENDENCY
CURRENT/FUTURE MAINTENANCE WORKER
AOC 57 AREA 2 INDUSTRIAL
FORT DEVENS, MA

CARCINOGENIC EFFECTS

CANCER TOTAL RISK RISK 2.9E-10 22.15%		
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CANCER RISK 2.9E-10		
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COMPOUND	Chromium	

COMPOUND	SOR. CONCENTRATION (mg/kg)	VF (π ³ /kg)	AIR CONCENTRATION VOLATILES PARTIC (Ing/ht²) (ug/ht²)	ULATES (m²)	(mg/kg-day)	REFERENCE DOSE (mg/kg-day)	HAZARD	PERCENT TOTAL RISK
Arsenic	21	AN		1.6E-08	2.1E-10	QN		
Chromium	27	AZ		2.0E-08	2.7E-10	2.9E-05	9.2E-06	2.63%
Iron	16,400	AN		1.2E-05	1.6E-07	ND		
Manganese	481	AZ		3.6E-07	4.7E-09	1.4E-05	3.4E-04	97.11%
VPH								
29-C12 Aliphatics	32	AN AN		2.4E-08	3.2E-10	5.7E-01	5.5E-10	0.00016%
C9-C10 Aromatics	23	YZ YZ		1.7E-08	2.3E-10	1.7E-02	1.3E-08	0.0038%
EPH								
C9-C18 Aliphatics	465	Y X		3.5E-07	4.6E-09	5.7E-01	8.1E-09	0.0023%
C19-C36 Aliphatics	2680	Y X		4.3E-06	5.6E-08	QN		
C11-C22 Aromatics	1,770	YZ YA		1.3E-06	1.7E-08	2.0E-02	8.7E-07	0.25%
					SUMMARY	SUMMARY HAZARD INDEX	0.0003	

INCIDENTAL INGESTION OF AND DERMAL CONTACT WITH SURFACE SOIL - RME FUTURE COMMERCIAL/INDUSTRIAL WORKER
AOC 57 AREA 2 INDUSTRIAL
FORT DEVENS, MA

14-Mar-00

EXPOSURE PARAMETERS

EQUATIONS

CONCENTRATION SOIL INGESTION RATE FRACTION INGESTED SOIL ADHERENCE FACTOR SURFACE AREA EXPOSED CONVERSION FACTOR BODY WEIGHT EXPOSURE FREQUENCY EXPOSURE FREQUENCY EXPOSURE PREQUENCY EXPOSURE TIME CANCER	CS FI SAF SA CF BW BF BT AT	See Below• 100 100% 0.016 12,731 0.000001 70 150 25	mg/kg mg/day mg/cm² cm² kg kg days/year years	CANCER RISK = INTAKE HAZARD QUOTIENT = IN INTAKE = (INTAKE-INGE INTAKE-INGESTION = INTAKE-DERMAL =	CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR (mg/kg-day)-1 HAZARD QUOTIENT = INTAKE (mg/kg-day) / REFERENCE DOSE (mg/kg-day) INTAKE = (INTAKE-INGESTION) + (INTAKE-DERMAL) BW x AT x 365 days/yr INTAKE-DERMAL = CS x SA x SA F x AE x CF x EF x ED BW x AT x 365 days/yr BW x AT x 365 days/yr	
DERMAL ABSORPTION EFFICIENCY Notes: For noncarcinogenic effects: AT = ED The dermal absorption efficiency is from the Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual Supplemental Guidance Dermal Risk Assessment, 1998. *The lesser of the 95 % upper confidence limit (UCL) & maximum concentration. ND = Value not determined	AE AE kisk Assessment Guidance ral Guidance Dermal Risk.	ific ume	years unitless			

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INCIDENTAL INGESTION OF AND DERMAL CONTACT WITH SURFACE SOIL - RME
FUTURE COMMERCIAL/INDUSTRIAL WORKER
AOC 57 AREA 2 INDUSTRIAL
FORT DEVENS, MA

CARCINOGENIC EFFECTS

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PERCENT TOTAL RISK	7.0E-06 100.00%	
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TOTAL CANCER RISK	1.7	
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*	4.3E-07	
ANCER RISK DERMAL	4.3	7
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INTAKE DERMAL (mg/kg-day)	2.7E-07	
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DERMAL ABSORPTION EFFICIENCY	5	
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COMPOUND	SOLL CONCENTRATION (mg/kg)	INGESTION (mg/kg-day)	ABSORPTION EFFICENCY	DERMAL (mg/kg-dny)	ORAL DERN ORAL DERN (mp/kg-day) (mg/kg	CE DOSE DERWAL (mg/kg-day)	HAZARD QUOTIENT INGESTION	HAZARD QUOTIENT DERMAL	TOTAL HAZARD QUOTIENT	PERCENT TOTAL RISK
	21	1.2E-05	0.03	7.5E-07	3.0E-04	2.9E-04	4.1E-02	2.6E-03	4.4E-02	44.36%
	27	1.6E-05	QN		2.0E-02	ΩN	7.9E-04		7.9E-04	0.80%
•	16,400	9.6E-03	QN		QN	QN				
	481	2.8E-04	QN		7.1E-02	QN	4.0E-03		4.0E-03	4.04%
C9-C12 Aliphatics	32	1.9E-05	0.17	6.5E-06	6.0E-01	5.5E-01	3.1E-05	1.2E-05	4.3E-05	0.04%
C9-C10 Aronatics	23	1.4E-05	0.17	4.7E-06	3.0E-02	2.7E-02	4.5E-04	1.7E-04	6.2E-04	0.63%
C9-C18 Aliphatics	465	2.7E-04	0.17	9.5E-05	6.0E-01	5.5E-01	4.5E-04	1.7E-04	6.3E-04	0.64%
C19-C36 Aliphatics	2,680	3.3E-03	0.17	1.2E-03	6.0E+00	5.5E+00	5.6E-04	2.1E-04	7.7E-04	0.78%
C11-C22 Aromatics	1770	1.0E-03	0.17	3.6E-04	3.0E-02	2.7E-02	3.5E-02	1.3E-02	4.8E-02	48.70%



CWIW-SS2I INHALATION EXPOSURE TO PARTICULATES IN SURFACE SOIL - RME FUTURE COMMERCIAL/INDUSTRIAL WORKER AOC 57 AREA 2 INDUSTRIAL FORT DEVENS, MA

16-Mar-00

EXPOSURE PARAMETERS

EQUATIONS

CONCENTRATION SOIL* CONCENTRATION SOIL* CONCENTRATION AIR PARTICULATES CONCENTRATION AIR VOLATILES VOLATILIZATION FACTOR** PARTICULATE EMISSIONS FACTOR INHALATION RATE BODY WEIGHT EXPOSURE THE QUENCY EXPOSURE PURATION RELATIVE ABSORPTION FACTOR RELATIVE ABSORPTION FACTOR	C Ap C Av VF VF VF VF VF VF VF VF VF VF VF VF VF	See below Calculated Calculated Calculated 1.32B+09 1.32B+09 1.6 70 8 150 25	mg/kg mg/m² mg/m² m²/kg ug/m² m²/nour kg hours/day days/year	CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR (mg/kg-day)-1 HAZARD QUOTIENT = INTAKE (mg/kg-day) / REFERENCE CONCENTRATION (mg/kg-day) INTAKE - INHALATION = (CAp + Cav) x RAF x lin x ET x EF x ED BW x AT x 365 days/yr AIR CONCENTRATION PARTICULATES = CS x 1/PEF AIR CONCENTRATION VOLATILES = CS x 1/VF
CANCER	AT AT	70	years	(VF not calculated because there are no VOCs selected as CPCs).
Notes: * Soil concentration used is the lesser of the 95 % upper confidence limit (UCL) **Volatilization factor used only for volatile chemicals of potential concern. For noncarcinogenic effects: AT = ED ND = Value not determined	limit (UCL.)	& maximum concentration		



CWIW-SS2I INHALATION EXPOSURE TO PARTICULATES IN SURFACE SOIL - RME FUTURE COMMERCIAL/INDUSTRIAL WORKER AOC 57 AREA 2 INDUSTRIAL FORT DEVENS, MA

CARCINOGENIC EFFECTS

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амподиос	SOG CONCENTRATION (nig/lg)	VP (m ² /kg)	AIR CONCENTRATION VOLATILES PARTICE (Infg/m!) (mg/m)	PARTICULATES INTAKE (ODE/OF)	INTAKE nig/kg·day)	REFERENCE DOSE (ng/kg-day)	HAZARD	Percent Totac Risk
Arsenic	21	NA		1.6E-08	1.2E-09	QN		
Chromium	27			2.0E-08	1.5E-09	2.9E-05	5.3E-05	2.63%
Iron	16,400	NA		1.2E-05	9.3E-07	QN		
Manganese	481	NA		3.6E-07	2.7E-08	1.4E-05	2.0E-03	97.11%
VPH								· · · · · ·
C9-C12 Aliphatics	32	NA		2.4E-08	1.8E-09	5.7E-01	3.2E-09	0.00016%
C9-C10 Aromatics	23	NA		1.7E-08	1.3E-09	1.7E-02	7.7E-08	0.0038%
EPH								
C9-C18 Aliphatics	465	NA NA		3.5E-07	2.6E-08	5.7E-01	4.6E-08	0.0023%
C19-C36 Aliphatics	0895	NA		4.3E-06	3.2E-07	QN		
C11-C22 Aromatics	077,1	Z		1.3E-06	1.0E-07	2.0E-02	5.0E-06	0.25%
					SUMMARY	SUMMARY HAZARD INDEX	0.002	

CWIW-SSZI(CT)
INCIDENTAL INGESTION OF AND DERMAL CONTACT WITH SURFACE SOIL - CENTRAL TENDENCY
FUTURE COMMERCIAL/INDUSTRIAL WORKER
AOC 57 AREA 2 INDUSTRIAL
FORT DEVENS, MA

14-Mar-00

EXPOSURE PARAMETERS

EQUATIONS

PARAMETER	SYMBOL	VALUE	UNITS			
CONCENTRATION SOIL	S	See Below*	mg/kg	CANCER RISK = INTAKE (mg/kg-day) x	CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR (mg/kg-day)-1	
INGESTION RATE	R	50	mg/day			
FRACTION INGESTED	Ħ	%001		HAZARD QUOTIENT = INTAKE (mg/kg-day) / REFERENCE DOSE (mg/kg-day)	;-day) / REFERENCE DOSE (mg/kg-day)	
SOIL ADHERENCE FACTOR	SAF	0.016	mg/cm²			
SURFACE AREA EXPOSED	SA	13,731	cm³	INTAKE = (INTAKE-INGESTION) + (INTAKE-DERMAL)	TAKE-DERMAL)	
CONVERSION FACTOR	S.	0.00001	kg/mg			_
BODY WEIGHT	BW	70	8	INTAKE-INGESTION = CS x IR	CS x IR x FI x CF x EF x ED	
EXPOSURE FREQUENCY	EF	150	days/year	BWx	BW x AT x 365 days/yr	
EXPOSURE DURATION	GB	9.9	years			
AVERAGING TIME				$INTAKE-DERMAL = \frac{CS \times SA \times S}{1}$	CS x SA x SAF x AE x CF x EF x ED	
CANCER	AT	70	years	BWa	BW x AT x 365 days/yr	
NONCANCER	AT	9.9	years			
DERMAL ABSORPTION	AE	Chemical-specific	unitless			
EFFICIENCY						
Notes:						
For noncarcinogenic effects: AT = ED						
The dermal absorption efficiency is from the Risk Assessment Guidance for Superfund Volume I:	isk Assessment Guidance	for Superfund Volume I:				
Human Health Evaluation Manual Supplemental Guidance Dermal Risk Assessment, 1998.	al Guidance Dermal Risk	Assessment, 1998.				
*The lesser of the 95 % upper confidence limit (UCL) & maximum concentration.	(UCL) & maximum cond	entration.				
ND = Value not determined						٦

CWIW-SSZI(CT)
INCIDENTAL INGESTION OF AND DERMAL CONTACT WITH SURFACE SOIL - CENTRAL TENDENCY
FUTURE COMMERCIAL/INDUSTRIAL WORKER

AOC 57 AREA 2 INDUSTRIAL FORT DEVENS, MA

CARCINOGENIC EFFECTS

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COMPOUND	SOIL CONCENTRATION (mg/kg)	INTAKE INGESTION (mg/kg:day)	DERMAL ABSORPTION EFFICIENCY	INTAKE DERMAL (ng/kg-day)	REFERENCE DOSE ORAL DERM (**ig%g-(a*)) (ug/kg	CE DCIST DERMAL (ing/kg-day)	HAZARD QUOTIENT INGESTION	HAZARD QUOTIENT DERMAL	TOTAL HAZARD QUOTTENT	PERCENT TOTAL RISK
Arsenic	21	6.2E-06	0.03	8.1E-07	3.0E-04	2.9E-04	2.1E-02	2.8E-03	2.3E-02	39.72%
Chronium	27	7.9E-06	QN		2.0E-02	QN	4.0E-04		4.0E-04	0.67%
Iron	16,400	4.8E-03	Q		N	QN				
Manganese	481	1.4E-04	QN		7.1E-02	ΩN	2.0E-03		2.0E-03	3.38%
VPH	•									
C9-C12 Aliphatics	32	9.4E-06	0.17	7.0E-06	6.0E-01	5.5E-01	1.6E-05	1.3E-05	2.8E-05	0.05%
C9-C10 Aromatics	23	6.8E-06	0.17	5.0E-06	3.0E-02	2.7E-02	2.3E-04	1.9E-04	4.1E-04	0.70%
ЕРН										
C9-C18 Aliphatics	465	1.4E-04	0.17	1.0E-04	6.0E-01	5.5E-01	2.3E-04	1.9E-04	4.1E-04	0.70%
C19-C36 Aliphatics	2,680	1.7E-03	0.17	1.2E-03	6.0E+00	5.5E+00	2.8E-04	2.3E-04	5.0E-04	%98.0
C11-C22 Aromatics	1770	5.2E-04	0.17	3.9E-04	3.0E-02	2.7E-02	1.7E-02	1.4E-02	3.2E-02	53.91%
				SUMMARY	SUMMARY HAZARD INDEX	×	0.04		90:0	
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CWIW-<u>SS</u>2I(CT) INHALATION EXPOSURE TO PARTICULATES IN SURFACE SOIL - CENTRAL TENDENCY FUTURE COMMERCIAL/INDUSTRIAL WORKER AOC 57 AREA 2 INDUSTRIAL FORT DEVENS, MA

16-Mar-00

## EXPOSURE PARAMETERS

EQUATIONS

HAZARD QUOTIENT = INTAKE (mg/kg-day) / REFERENCE CONCENTRATION (mg/kg-day) CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR (mg/kg-day)-1 INTAKE - INHALATION = (CAp + Cay) x RAF x IhR x ET x EF x ED (VF not calculated because there are no VOCs selected as CPCs). AIR CONCENTRATION PARTICULATES = CS x 1/PEF BW x AT x 365 days/yr AIR CONCENTRATION VOLATILES = CS x 1/VF days/year ug/m³ m³/hour nours/day mg/kg mg/m³ mg/m³ m³/kg years years ж 8 Notes: * Soil concentration used is the lesser of the 95 % upper confidence limit (UCL) & maximum concentration Calculated 5 See below 150 6.6 Calculated 1.32E+09 Calculated 100% 8 8 8 IBW BW ET ET EF ED ED EX ΥF PEF Ā **Volatilization factor used only for volatile chemicals of potential concern. CANCER NONCANCER CONCENTRATION AIR PARTICULATES CONCENTRATION AIR VOLATILES PARTICULATE EMISSIONS FACTOR RELATIVE ABSORPTION FACTOR PARAMETER For noncarcinogenic effects: AT = ED **VOLATILIZATION FACTOR**** CONCENTRATION SOIL* EXPOSURE FREQUENCY EXPOSURE DURATION ND = Value not determined INHALATION RATE AVERAGING TIME EXPOSURE TIME BODY WEIGHT

CWIW-SS2I(CT)
INHALATION EXPOSURE TO PARTICULATES IN SURFACE SOIL - CENTRAL TENDENCY
FUTURE COMMERCIAL/INDUSTRIAL WORKER
AOC 57 AREA 2 INDUSTRIAL
FORT DEVENS, MA

### CARCINOGENIC EFFECTS

PERCENT CANCER TOTAL RISK RISK	1.7E-09 22.15	77.85%	6
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CANCER	7E-09	60	0
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COMPOUND	SOR. CONCRNITRATION (mg/kg)	уР (m ² /kg)	AIR CONCENTRATION VOLATILES PARTIC (mg/m²) (ng/m²)	ULATES (m²)	INTAKE (mg/kg-day)	REFERENCE DOSE (mg/kg-day)	HAZARD QUGTIENT	PERCENT TOTAL RISK
Arsenic	21	AN		1.6E-08	1.2E-09	QN		
Chromium	27.	AN		2.0E-08	1.5E-09	2.9E-05	5.3E-05	2.63%
Iron	16,400	AZ AZ		1.2E-05	9.3E-07	QN		
Manganese	481	AZ		3.6E-07	2.7E-08	1.4E-05	2.0E-03	97.11%
VPH								
C9-C12 Aliphatics	32	Y'A		2.4E-08	1.8E-09	5.7E-01	3.2E-09	0.00016%
C9-C10 Aromatics	23	AN		1.7E-08	1.3E-09	1.7E-02	7.7E-08	0.0038%
HdS								
C9-C18 Aliphatics	465	YZ YY		3.5E-07	2.6E-08	5.7E-01	4.6E-08	0.0023%
C19-C36 Aliphatics	2680	YZ YZ		4.3E-06	3.2E-07	QN		
C11-C22 Aromatics	1,770	Ϋ́Z		1.3E-06	1.0E-07	2.0E-02	5.0E-06	0.25%
					SUMMARY	SUMMARY HAZARD INDEX	0.002	

CWIW-GW21
INGESTION OF GROUNDWATER AS DRINKING WATER (UNFILTERED SAMPLES) - RME
CURRENT/FUTURE LAND USE - COMMERCIAL/INDUSTRIAL WORKER
AOC 57 AREA 2 INDUSTRIAL
FORT DEVENS, MA

#### EXPOSURE PARAMETERS

CONCENTRATION WATER	CW	chemical-specific	ug/liter	CANCER RISK - INTAKE (mg/kg-day) x CANCER SLOPE FACTOR (mg/kg-day)-1
INCESTION RATE	R	_	liters/day	
BODY WEIGHT	BW	0/	kg	kg HAZARD QUOITIENT = INTAKE (mg/kg-day) / REFERENCE DOSE (mg/kg-day)
CONVERSION FACTOR	ម	0.001	Sn/8m	
EXPOSURE FREQUENCY	田	250	days/year	
EXPOSURE DURATION	69	25	years	INTAKE - CWXIRXEFXEDXCF
AVERAGING TIME				BW x AT x 365 days/year
CANCER	AT	92	years	
NONCANCER	AT	25	years	
Notes: For noncarcinogenic effects: AT = ED	Add Add Add Add Add Add Add Add Add Add			

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CWIW-GW21
INGESTION OF GROUNDWATER AS DRINKING WATER (UNFILTERED SAMPLES) - RME
CURRENT/FUTURE LAND USE - COMMERCIAL/INDUSTRIAL WORKER
AOC 57 AREA 2 INDUSTRIAL
FORT DEVENS, MA

CARCINOGENIC EFFECTS

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CWIW-GW2I(CT)
INGESTION OF GROUNDWATER AS DRINKING WATER (UNFILTERED SAMPLES) - CENTRAL TENDENCY
CURRENT/FUTURE LAND USE - COMMERCIAL/INDUSTRIAL WORKER
AOC 57 AREA 2 INDUSTRIAL
FORT DEVENS, MA

#### EXPOSURE PARAMETERS

CONCENTRATION WATER	CW	chemical-specific	ug/liter	CANCER RISK - INTAKE (mg/kg-day) x CANCER SLOPE FACTOR (mg/kg-day)-1
INGESTION RATE	æ	-	liters/day	
BODY WEIGHT	BW	07	kg 8	HAZARD QUOITIENT = INTAKE (mg/kg-day) / REFERENCE DOSE (mg/kg-day)
CONVERSION FACTOR	ర్	0.001		
EXPOSURE FREQUENCY	늄	250		
EXPOSURE DURATION	ED	9.9		INTAKE = CWXIRXEFXEDXCF
AVERAGING TIME				BW x AT x 365 days/year
CANCER	AT	02	years	
NONCANCER	AŢ	9.9	years	



CWIW-GW2I(CT)
INGESTION OF GROUNDWATER AS DRINKING WATER (UNFILTERED SAMPLES) - CENTRAL TENDENCY
CURRENT/FUTURE LAND USE - COMMERCIAL/INDUSTRIAL WORKER
AOC 57 AREA 2 INDUSTRIAL
FORT DEVENS, MA

CARCINOGENIC EFFECTS

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JA-SS2I

INCIDENTAL INGESTION OF AND DERMAL CONTACT WITH SURFACE SOIL - RME FUTURE CONSTRUCTION WORKER
AOC 57 AREA 2 INDUSTRIAL
FORT DEVENS, MA

14-Mar-00

### EXPOSURE PARAMETERS

EQUATIONS

PARAMETIER	SYMBOL	VALUE	CNITS		
CONCENTRATION SOIL	S	See Below*	mg/kg	CANCER RISK = INTAKE (	CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR (mg/kg-day)-1
INGESTION RATE	푔	480	mg/day		
FRACTION INGESTED	E	%001		HAZARD QUOTIENT = INT	HAZARD QUOTIENT = INTAKE (mg/kg-day) / REFERENCE DOSE (mg/kg-day)
SOIL ADHERENCE FACTOR	SAF	0.28	mg/cm²		
SURFACE AREA	SA	9200	cm ²		
CONVERSION FACTOR	ţ,	0.000001	kg/mg	INTAKE = (INTAKE-INGES	INTAKE = (INTAKE-INGESTION) + (INTAKE-DERMAL)
BODY WEIGHT	BW	70	kg		
EXPOSURE FREQUENCY	描	250	days/year	INTAKE-INGESTION =	CS x IR x F1 x CF x EF x ED
EXPOSURE DURATION	ED	0.5	years		BW x AT x 365 days/yr
AVERAGING TIME					
CANCER	AT	70	years	INTAKE-DERMAL =	CS x SA x SAF x AE x CF x EF x ED
NONCANCER	AT	0.5	years	-	BW x AT x 365 days/yr
DERMAL ABSORPTION	AE	Chemical-specific	unitless		
EFFICIENCY					
Notes:					
For noncarcinogenic effects: AT = ED					
The dermal absorption efficiency is from the Risk Assessment Guidance for Superfund Volume I:	sk Assessment Guidance	for Superfund Volume I:			
Human Health Evaluation Manual Supplemental Guidance Dermal Risk Assessment, 1998.	I Guidance Dermal Risk	Assessment, 1998.			
*The lesser of the 95 % upper confidence limit (UCL) & maximum concentration.	(UCL) & naximum cond	entration.			
ND = Value not determined					

Rev. 8/92

Rev. 8/9;

CON-SS21
INCIDENTAL INGESTION OF AND DERMAL CONTACT WITH SURFACE SOIL - RME
FUTURE CONSTRUCTION WORKER
AOC 57 AREA 2 INDUSTRIAL
FORT DEVENS, MA

## CARCINOGENIC EFFECTS

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COMPOUND CONCENTRATION (INg/kg)	INGESTION (mg/kg-dex)	ABSORPTION EFFICIENCY	BERMAL (mg/kg-day)	ORAL (mg/kg-day)	DERNYAL (mg/kg-day)	QUOTIENT INGESTION	QUOTIENT DERMAL	HAZARD QUOTIENT	TOTAL RISK
Arsenic 2	.1 9.9E-05	0.03	9.0E-06	3.0E-04	2.9E-04	3.3E-01	3.1E-02	3.6E-01	81.14%
Chromium 2.	27 1.3E-04	QX	0.0E+00	2.0E-02	5.0E-04	6.3E-03	0.0E+00	6.3E-03	1.43%
Iron 16,400	0 7.7E-02	QX	0.0E+00	ON.	QN			-	
Manganese 481	1 2.3E-03	QN	0.0E+00	7.1E-02	4.30E-03	3.2E-02	0.0E+00	3.2E-02	7.18%
VPH									
C9-C12 Aliphatics 3:	32 1.5E-04	0.17	7.8E-05	6.0E+00	5.5E+00	2.5E-05	1.4E-05	3.9E-05	0.01%
C9-C10 Aromatics 2:	23 1.1E-04	0.17	5.6E-05	3.0E-01	2.7E-01	3.6E-04	2.1E-04	5.7E-04	0.13%
EPH									
C9-C18 Aliphatics 465	.5 2.2E-03	0.17	1.1E-03	6.0E+00	5.5E+00	3.6E-04	2.0E-04	5.7E-04	0.13%
C19-C36 Aliphatics 5680	10 2.7E-02	0.17	1.4E-02	6.0E+01	5.5E+01	4.4E-04	2.5E-04	6.9E-04	0.16%
C11-C22 Aromatics 1,770	8.3E-03	0.17	4.3E-03	3.0E-01	2.7E-01	2.8E-02	1.6E-02	4.4E-02	9.83%

CON-SS21 INHALATION EXPOSURE TO PARTICULATES IN SURFACE SOIL - RME FUTURE CONSTRUCTION WORKER AOC 57 AREA 2 INDUSTRIAL FORT DEVENS, MA

#### EXPOSURE PARAMETERS

	mg/kg CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR (mg/kg-day)-1	mg/m²	mg/m² HAZARD QUOTIENT = INTAKE (mg/kg-day) / REFERENCE CONCENTRATION (mg/kg-day)	m²/kg	ug/nr?	m ² /hour INTAKE - INHALATION = ( <u>CAD + CaV) x RAF x INR x ET x EF x ED</u>	kg BW x AT x 365 days/yr	hours/day	days/year	years AIR CONCENTRATION PARTICULATES = CS x 1/PEF		AIR CONCENTRATION VOLATILES = CS x 1/VF	years (VF not calculated because there are no VOCs selected as CPCs).	yeus				
SYMBOL	CS See below	CAp	CAv	VF Calculated	PEF 1.32E+09	IhR	BW	ET	EF	ED	RAF 100%	-	AT	AT 0.50	confidence limit (UCL) & maximum conc	tial concern.		
PARAMETER	CONCENTRATION SOIL*	CONCENTRATION AIR PARTICULATES	CONCENTRATION AIR VOLATILES	VOLATILIZATION FACTOR**	PARTICULATE EMISSIONS FACTOR	INHALATION RATE	BODY WEIGHT	EXPOSURE TIME	EXPOSURE FREQUENCY	EXPOSURE DURATION	RELATIVE ABSORPTION FACTOR	AVERAGING TIME	CANCER	NONCANCER	Notes: * Soil concentration used is the lesser of the 95 % upper confidence limit (UCL) & maximum concentration	**Volatilization factor used only for volatile chemicals of potential concern.	For noncarcinogenic effects: AT = ED	ND = Value not determined

Rev. 8/92

CON-SS21
INHALATION EXPOSURE TO PARTICULATES IN SURFACE SOIL - RME
FUTURE CONSTRUCTION WORKER
AOC 57 AREA 2 INDUSTRIAL
FORT DEVENS, MA

#### CARCINOGENIC EFFECTS

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Chomium	7.2	ζ <u>ζ</u> Ζ		1.0E-08	4.1E-09	7 9F-05	1 8F-04	
Iron	16,400	Ϋ́Z		1.2E-05	3.2E-06	QN		
Manganese	481	AN A	_	3.6E-07	9.4E-08	1.4E-05	6.7E-03	97.34%
VPH								
9-C12 Aliphatics	32	AN		2.4E-08	6.3E-09	5.7E+00	1.1E-09	0.00002%
C9-C10 Aromatics	23	Ϋ́Z		1.7E-08	4.5E-09	1.7E-01	2.6E-08	
EPH				-				
C9-C18 Aliphatics	465	AN AN		3.5E-07	9.1E-08	5.7E+00	1.6E-08	
C19-C36 Aliphatics	2680	AN		4.3E-06	1.1E-06	ND		
C11-C22 Aromatics	1,770	¥Z		1.3E-06	3.5E-07	2.0E-01	1.7E-06	0.025%

INCIDENTAL INGESTION OF AND DERMAL CONTACT WITH SUBSURFACE SOIL - RME FUTURE CONSTRUCTION WORKER
AOC 57 AREA 2 INDUSTRIAL
FORT DEVENS, MA

14-Mar-00

### EXPOSURE PARAMETERS

_			
R	mg/kg	ANCER RISK = INTAKE (	CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR (mg/kg-day)-1
FI   100%     SAF   0.28   mg/cm²     SA   5200   cm²     CF   0.000001   kg/mg     BW   70   kg     EF   250   days/year     ED   0.5   years     NNCER   AT   0.5     A			
SA 5200 mg/cm² SA 5200 cm² CF 0.000001 kg/mg BW 70 kg RP 250 days/year ED 0.5 years NNCER AT 70 years		AZARD QUOTIENT = INT	HAZARD QUOTIENT = INTAKE (mg/kg-day) / REFERENCE DOSE (mg/kg-day)
SA   S200 cm² cm²			
CF         0.000001         kg/mg           BW         70         kg           F         250         days/year           ED         0.5         years           ONCANCER         AT         70         years           AT         AT         0.5         years			
V         EF         250         days/year           ED         0.5         years           CANCER         AT         70         years           AT         AT         0.5         years	kg/mg	TAKE = (INTAKE-INGES	INTAKE = (INTAKE-INGESTION) + (INTAKE-DERMAL)
Y         EF         250         days/year           ED         0.5         years           CANCER         AT         70         years           DNCANCER         AT         0.5         years			
CANCER AT 70 years  ONCANCER AT 0.5 years  ONCANCER AT 0.5 years  AT 0.5 years	days/year	TAKE-INGESTION =	CS x IR x Fl x CF x EF x ED
CANCER AT 70 years ONCANCER AT 0.5 years AE Chamical consists			BW x AT x 365 days/yr
CANCER AT 70 years NCANCER AT 0.5 years AE Chamical consists			
DNCANCER AT 0.5	years	TAKE-DERMAL =	CS x SA x SAF x AE x CF x EF x ED
A Discontinuing			BW x AT x 365 days/yr
anade manage and a	unitless		
EFFICIENCY			
Notes:			
For noncarcinogenic effects: AT = ED	•		
The dermal absorption efficiency is from the Risk Assessment Guidance for Superfund Volume I:			
Human Health Evaluation Manual Supplemental Guidance Dermal Risk Assessment, 1998.			
*The lesser of the 95 % upper confidence limit (UCL) & maximum concentration.			
ND = Value not determined			

CON-SB2I INCIDENTAL INGESTION OF AND DERMAL CONTACT WITH SUBSURFACE SOIL - RME FUTURE CONSTRUCTION WORKER AOC 57 AREA 2 INDUSTRIAL FORT DEVENS, MA

#### CARCINOGENIC EFFECTS

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COMPOUND	SOIL CONCENTRATION (mg/kg)	INTAKE INGESTION (mg/kg-day)	DERMAL ABSORPTION PFFICTENCY	INTAKE DERMAL (mg/kg-day)	REFERENCE DOSE ORAL DERN (mg/kg-day) (mg/kg	CEDOSE DERNYAL (mg/kg-day)	HAZARD QUOTIENT INGESTION	HAZARD QUOTIENT DERMAL	TOTAL HAZARD QUOTTENT	PERCENT FOTAL RISK
Arsenic	6.87	4.6E-05	0.03	4.2E-06	3.0E-04	2.9E-04	1.5E-01	1.5E-02	1.7E-01	91.33%
Iron	8080	3.8E-02	QN	0.0E+00	ND	QN				
Manganese	231	1.1E-03	QN	0.0E+00	7.1E-02	4.30E-03	1.5E-02	0.0E+00	1.5E-02	8.25%
VPH										
C9-C12 Aliphatics	0.57	2.7E-06	0.17	1.4E-06	6.0E+00	5.5E+00	4.5E-07	2.5E-07	7.0E-07	0.0004%
C9-C10 Aronatics	0.41	1.9E-06	0.17	9.9E-07	3.0E-01	2.7E-01	6.4E-06	3.7E-06	1.0E-05	0.01%
ЕРН										
C9-C18 Aliphatics	8.2	3.9E-05	0.17	2.0E-05	6.0E+00	5.5E+00	6.4E-06	3.6E-06	1.0E-05	0.01%
C19-C36 Aliphatics	101	4.7E-04	0.17	2.4E-04	6.0E+01	5.5E+01	7.9E-06	4.4E-06	1.2E-05	%10.0
C11-C22 Aronatics	31	1.5E-04	0.17	7.5E-05	3.0E-01	2.7E-01	4.9E-04	2.5E-04	7.4E-04	0.40%
				SUMMARY	SUMMARY RAZARD INDEX	X	0.2	10.0	0.7	



INHALATION EXPOSURE TO PARTICULATES IN SUBSURFACE SOIL - RME FUTURE CONSTRUCTION WORKER AOC 57 AREA 2 INDUSTRIAL FORT DEVENS, MA

14-Mar-00

#### **EXPOSURE PARAMETERS**

EQUATIONS

HAZARD QUOTIENT = INTAKE (mg/kg-day) / REFERENCE CONCENTRATION (mg/kg-day) CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR (mg/kg-day)-1 INTAKE - INHALATION = (CAp + Cay) x RAF x IhR x ET x EF x ED (VF not calculated because there are no VOCs selected as CPCs). AIR CONCENTRATION PARTICULATES = CS x 1/PEF AIR CONCENTRATION VOLATILES = CS x 1/VF BW x AT x 365 days/yr hours/day days/year m³/hour mg/m³ m³/kg ug/m³ years years 9 Notes: * Soil concentration used is the lesser of the 95 % upper confidence limit (UCL) & maximum concentration 250 0.5 Calculated 1.32E+09 0.50 Calculated Calculated S & & # PEF BW ET EF ED 뚔 AT **Volatilization factor used only for volatile chemicals of potential concern. CANCER NONCANCER CONCENTRATION AIR PARTICULATES PARTICULATE EMISSIONS FACTOR CONCENTRATION AIR VOLATILES RELATIVE ABSORPTION FACTOR PARAMETER For noncarcinogenic effects: AT = ED **VOLATILIZATION FACTOR**** EXPOSURE FREQUENCY CONCENTRATION SOIL* EXPOSURE DURATION ND = Value not determined INHALATION RATE AVERAGING TIME EXPOSURE TIME BODY WEIGHT

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CON-SB2I INHALATION EXPOSURE TO PARTICULATES IN SUBSURFACE SOIL - RME FUTURE CONSTRUCTION WORKER AOC 57 AREA 2 INDUSTRIAL FORT DEVENS, MA

#### CARCINOGENIC EFFECTS

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PERCENT TOTAL RISK	100.00%	
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INCIDENTAL INGESTION OF AND DERMAL CONTACT WITH SURFACE SOIL - CENTRAL TENDENCY FUTURE CONSTRUCTION WORKER
AOC 57 AREA 2 INDUSTRIAL
FORT DEVENS, MA

14-Mar-00

EXPOSURE PARAMETERS

CONCENTRATION SOIL   CS   See Below*   mg/kg   CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR (mg/kg-day) x CANCER SLOPE FACTOR (mg/kg-day) x CANCER SLOPE FACTOR (mg/kg-day) x CANCER SLOPE FACTOR (mg/kg-day) x CANCER SLOPE FACTOR (mg/kg-day) x CANCER SLOPE FACTOR (mg/kg-day) x CANCER SLOPE FACTOR (mg/kg-day) x CANCER SLOPE FACTOR (mg/kg-day) x CANCER SLOPE FACTOR (mg/kg-day) x CANCER SLOPE FACTOR (mg/kg-day) x CANCER SLOPE FACTOR (mg/kg-day) x CANCER SLOPE FACTOR (mg/kg-day) x CANCER SLOPE FACTOR (mg/kg-day) x CANCER SLOPE FACTOR (mg/kg-day) x CANCER SLOPE FACTOR (mg/kg-day) x CANCER SLOPE FACTOR (mg/kg-day) x CANCER SLOPE FACTOR (mg/kg-day) x CANCER SLOPE FACTOR (mg/kg-day) x CANCER SLOPE FACTOR (mg/kg-day) x CANCER SLOPE FACTOR (mg/kg-day) x CANCER SLOPE FACTOR (mg/kg-day) x CANCER SLOPE FACTOR (mg/kg-day) x CANCER SLOPE FACTOR (mg/kg-day) x CANCER SLOPE FACTOR (mg/kg-day) x CANCER SLOPE FACTOR (mg/kg-day) x CANCER SLOPE FACTOR (mg/kg-day) x CANCER SLOPE FACTOR (mg/kg-day) x CANCER SLOPE FACTOR (mg/kg-day) x CANCER SLOPE FACTOR (mg/kg-day) x CANCER SLOPE FACTOR (mg/kg-day) x CANCER SLOPE FACTOR (mg/kg-day) x CANCER SLOPE FACTOR SLOPE FACTOR SLOPE FACTOR SLOPE FACTOR SLOPE FACTOR SLOPE FACTOR SLOPE FACTOR SLOPE FACTOR SLOPE FACTOR SLOPE FACTOR SLOPE FACTOR SLOPE FACTOR SLOPE FACTOR SLOPE FACTOR SLOPE FACTOR SLOPE FACTOR SLOPE FACTOR SLOPE FACTOR SLOPE FACTOR SLOPE FACTOR SLOPE FACTOR SLOPE FACTOR SLOPE FACTOR SLOPE FACTOR SLOPE FACTOR SLOPE FACTOR SLOPE FACTOR SLOPE FACTOR SLOPE FACTOR SLOPE FACTOR SLOPE FACTOR SLOPE FACTOR SLOPE FACTOR SLOPE FACTOR SLOPE FACTOR SLOPE FACTOR SLOPE FACTOR SLOPE FACTOR SLOPE FACTOR SLOPE FACTOR SLOPE FACTOR SLOPE FACTOR SLOPE FACTOR SLOPE FACTOR SLOPE FACTOR SLOPE FACTOR SLOPE FACTOR SLOPE FACTOR SLOPE FACTOR SLOPE FACTOR SLOPE FACTOR SLOPE FACTOR SLOPE FACTOR SLOPE FACTOR SLOPE FACTOR SLOPE FACTOR SLOPE FACTOR SLOPE FACTOR SLOPE FACTOR SLOPE FACTOR SLOPE FACTOR SLOPE FACTOR SLOPE FACTOR SLOPE FACTOR SLOPE FACTOR SLOPE FACTOR SLOPE FACTOR SLOPE FACTOR SLOPE FACTOR SLOP	PARAMETER	SYMBOL	VALUE	CNITS			
Fi	CONCENTRATION SOIL	S	See Below*	mg/kg	CANCER RISK = INTAKE (mg/	kg-day) x CANCER SLOPE FACTOR (mg/kg-day)-1	
Fi   100%	INGESTION RATE	IR	480	mg/day			
TOR         SAF         0.28         mg/cm²           SA         5200         cm²         cm²           CF         0.000001         kg/mg         INTAKE-INGESTION =           BW         70         kg         rkg           Y         EF         250         days/vear         INTAKE-INGESTION =           CANCER         AT         0.25         years         INTAKE-DERMAL =           DNCANCER         AT         0.25         years         INTAKE-DERMAL =           AT = ED         Chemical-specific         unitless         AE         AE           AT = ED         AE         Chemical-specific         unitless           AT = ED         AE         Superfund Volume I:         anual Supplemental Guidance Dermal Risk Assessment, 1998.           Are confidence limit (UCL) & maximum concentration.         AE         AE         AE	FRACTION INGESTED	E	100%		HAZARD QUOTIENT = INTAK	E (mg/kg-day) / REFERENCE DOSE (mg/kg-day)	
SA   S200 cm²   Kg/mg   INTAKE = (INTAKE-INGES)   BW   70	SOIL ADHERENCE FACTOR	SAF	0.28	mg/cm²			
Y         EF         0.000000         kg/mg         INTAKE=(INTAKE-INGESTION = 1250 kgg           Y         EF         2.50 days/var         INTAKE-INGESTION = 1250 years           CANCER         AT         70         years         INTAKE-DERMAL = 1250 years           DNCANCER         AT         0.25         years         INTAKE-DERMAL = 1250 years           AT = ED         Chemical-specific         unitless         AT         AT           AT = ED         AT = ED         anual Supplemental Guidance for Superfund Volume I:         anual Supplemental Guidance Dermal Risk Assessment, 1998.	SURFACE AREA	SA	5200	cm ²			
Y         BW         70         kg           PEF         250         days/year         INTAKE-INGESTION =           CANCER         AT         0.25         years         INTAKE-DERMAL =           DNCANCER         AT         0.25         years         INTAKE-DERMAL =           AT         AT         0.25         years         INTAKE-DERMAL =           AT         AE         Chemical-specific         unitless           AT = ED         AE         Chemical-specific         unitless           AT = ED         Assessment Guidance for Superfund Volume I:         anual Supplemental Guidance Dermal Risk Assessment, 1998.           Are confidence limit (UCL) & maximum concentration.         Are confidence limit (UCL) & maximum concentration.	CONVERSION FACTOR	CF	0.000001	kg/mg	INTAKE = (INTAKE-INGESTIC	ON) + (INTAKE-DERMAL)	
Y         EF         2.50         days/year         INTAKE-INGESTION =           CANCER         AT         0.25         years         INTAKE-DERMAL =           DNCANCER         AT         0.25         years         INTAKE-DERMAL =           AD         AT         0.25         years         INTAKE-DERMAL =           AB         AT         Chemical-specific         unitless           AT = ED         AT         AT         AT	BODY WEIGHT	BW	02	ķ			
CANCER AT 70 years INTAKE-DERMAL = 2NCANCER AE AT 0.25 years O.25 years AE Chemical-specific unitless AT = ED  AT = ED  AT = ED  anual Supplemental Guidance For Superfund Volume I: anual Supplemental Guidance Dermal Risk Assessment, 1998.	EXPOSURE FREQUENCY	EF	250	days/year	INTAKE-INGESTION =	CS x IR x FI x CF x EF x ED	
CANCER AT 70 years INTAKE-DERMAL = 0.25 years AT Chemical-specific unitless AE Chemical-specific unitless AT ED AT Six Assessment Guidance for Superfund Volume I: anual Supplemental Guidance Dermal Risk Assessment, 1998.	EXPOSURE DURATION	Œ	0.25	years		BW x AT x 365 days/yr	
CANCER AT 70 years INTAKE-DERMAL = 0.25 years AT Chemical-specific unitless  AE Chemical-specific unitless  AT = BD  AT = BD  anual Supplemental Guidance for Superfund Volume I: anual Supplemental Guidance Dermal Risk Assessment, 1998.	AVERAGING TIME						
AT 0.25 years AE Chernical-specific unitless  AT = ED AT = ED AT = Supplemental Guidance for Superfund Volume I: anual Supplemental Guidance Dermal Risk Assessment, 1998.  Traconfidence limit (UCL) & maximum concentration.	CANCER	AT	02	years		XSA x SAF x AE x CF x EF x ED	
AT = ED  AT = ED  anal Supplemental Guidance for Superfund Volume I: anal Supplemental Guidance Dermal Risk Assessment, 1998. ar confidence limit (UCL) & maximum concentration.	NONCANCER	AT	0.25	years		BW x AT x 365 days/yr	
AT = ED nrcy is from the Risk anual Supplemental or confidence limit (1)	DERMAL ABSORPTION	AE	Chemical-specific	unitless			
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AT = ED ency is from the Risk anual Supplemental !	Notes:						
ency is from the Risk anual Supplemental ( er confidence limit (U	For noncarcinogenic effects: AT = ED						
Human Health Evaluation Manual Supplemental Guidance Dermal Risk Assessment, 1998.  *The leaser of the 95 % upper confidence limit (UCL) & maximum concentration.  ND = Value not determined	The dermal absorption efficiency is from the Ri	sk Assessment Guidance	for Superfund Volume 1:				
ar confidence limit (I	Human Health Evaluation Manual Supplements	al Guidance Dermal Risk	Assessment, 1998.				
ND = Value not determined	*The lesser of the 95 % upper confidence limit	(UCL) & maximum conc	entration.				
	ND = Value not determined						

CON-SS2I(CT)
INCIDENTAL INGESTION OF AND DERMAL CONTACT WITH SURFACE SOIL - CENTRAL TENDENCY
FUTURE CONSTRUCTION WORKER
AOC 57 AREA 2 INDUSTRIAL
FORT DEVENS, MA

## CARCINOGENIC EFFECTS

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COMPOUND	SOIL CONCENTRATION (IND/ND)	INTAKE INGESTION (mg/kg-dey)	DERMAL ABSORPTION EFFICENCY	INTAKE DERMAL (ng/kg-day)	REFERENCE DOSE ORAL DERM (mg/kg-day) (mg/kg	GE DOSE DERMAL (mg/kg-day)	HAZARD QROTIENT INGESTION	HAZAKD QUOTIENT DERMAL	TOTAL HAZARD QUOTTENT	PERCENT FOTAL RISK
Arsenic	21	9.9E-05	0.03	9.0E-06	3.0E-04	2.9E-04	3.3E-01	3.1E-02	3.6E-01	81.14%
Chronium	27	1.3E-04	ΩN	0.0E+00	2.0E-02	5.0E-04	6.3E-03	0.0E+00	6.3E-03	1.43%
Iron	16,400	7.7E-02	QN	0.0E+00	ND	QN				
Manganese	481	2.3E-03	QN	0.0E+00	7.1E-02	4.30E-03	3.2E-02	0.0E+00	3.2E-02	7.18%
VPH										
C9-C12 Aliphatics	32	1.5E-04	0.17	7.8E-05	6.0E+00	5.5E+00	2.5E-05	1.4E-05	3.9E-05	0.01%
C9-C10 Aromatics	23	1.1E-04	0.17	5.6E-05	3.0E-01	2.7E-01	3.6E-04	2.1E-04	5.7E-04	0.13%
ЕРН										
C9-C18 Aliphatics	465	2.2E-03	0.17	1.1E-03	6.0E+00	5.5E+00	3.6E-04	2.0E-04	5.7E-04	0.13%
C19-C36 Aliphatics	2680	2.7E-02	0.17	1.4E-02	6.0E+01	5.5E+01	4.4E-04	2.5E-04	6.9E-04	0.16%
C11-C22 Aromatics	1,770	8.3E-03	0.17	4.3E-03	3.0E-01	2.7E-01	2.8E-02	1.6E-02	4.4E-02	9.83%
				SIMMARY	SIMMARY HAZARDINDEX	X	<b>E</b> ( <b>0</b> :333333333333333333333333333333333333	<b>30.0</b> 0000000000000000000000000000000000	P. 0	



CON-SSEICT)
INHALATION EXPOSURE TO PARTICULATES IN SURFACE SOIL - CENTRAL TENDENCY
FUTURE CONSTRUCTION WORKER
AOC 57 AREA 2 INDUSTRIAL
FORT DEVENS, MA

EXPOSURE PARAMETERS

	CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR (mg/kg-day)-1		HAZARD QUOTIENT = INTAKE (mg/kg-day) / REFERENCE CONCENTRATION (mg/kg-day)			INTAKE - INHALATION = $(CAp + Cbv) \times RAF \times IhR \times ET \times EF \times ED$	BW x AT x 365 days/yr			AIR CONCENTRATION PARTICULATES = CS x 1/PEF		AIR CONCENTRATION VOLATILES = CS x 1/VF	(VF not calculated because there are no VOC's selected as CPCs).						
UNITS	mg/kg C	mg/m³	mg/m³	m³/kg	ug/m³	m³/hour	kg g	hours/day	days/year	years		<u>*</u>	years	years					
VALUE	Sec below	Calculated	Calculated	Calculated	1.32E+09	3.3	02	00	250	0.25	100%		70	0.25	vimum concentration				
SYMBOL	SS	CAp	CAv	VF	PEF	IhR	BW	EI	HH.	ED	RAF		AT	AT	offdence limit (UCL) & ma	concern.			
PARAMETER PARAMETER	CONCENTRATION SOIL*	CONCENTRATION AIR PARTICULATES	CONCENTRATION AIR VOLATILES	VOLATILIZATION FACTOR**	PARTICULATE EMISSIONS FACTOR	INHALATION RATE	BODY WEIGHT	EXPOSURE TIME	EXPOSURE FREQUENCY	EXPOSURE DURATION	RELATIVE ABSORPTION FACTOR	AVERAGING TIME	CANCER	NONCANCER	Notes: * Soil concentration used is the lesser of the 95 % upper confidence limit (UCL) & maximum concentration	**Volatilization factor used only for volatile chemicals of potential concern.	For noncarcinogenic effects: AT = ED	ND = Value not determined	

CON-SS2I(CT)
INHALATION EXPOSURE TO PARTICULATES IN SURFACE SOIL - CENTRAL TENDENCY
FUTURE CONSTRUCTION WORKER
AOC 57 AREA 2 INDUSTRIAL
FORT DEVENS, MA

#### CARCINOGENIC EFFECTS

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COMFOUND	SOG CONCENTRATION (mg/kg)	V.F. (m ⁹⁷ Kg)	AIR CONCENTRATION VOLATILES FARTIC (mg/m²) (ng	ULATES (m)	(mg/kg-day)	REFERENCE DOSE (mg/kg-day)	HAZARD	PERCENT TOTAL RISK
Arsenic	21	NA		1.6E-08	4.1E-09	QN		
Chromium	27	AN AN		2.0E-08	5.3E-09	2.9E-05	1.8E-04	
Iron	16,400	YZ Y		1.2E-05	3.2E-06	QN		
Manganese	481	YZ Y		3.6E-07	9.4E-08	1.4E-05	6.7E-03	97.34%
VPH								
C9-C12 Aliphatics	32	Y.		2.4E-08	6.3E-09	5.7E+00	1.1E-09	0.00002%
C9-C10 Aromatics	23	YZ Y		1.7E-08	4.5E-09	1.7E-01	2.6E-08	
EPH								
C9-C18 Aliphatics	465	YZ Y		3.5E-07	9.1E-08	5.7E+00	1.6E-08	
C19-C36 Aliphatics	0895	YZ Y		4.3E-06	1.1E-06	QN		
C11-C22 Aromatics	1,770	YZ Z		1.3E-06	3.5E-07	2.0E-01	1.7E-06	0.025%
					SUMMARY	SUMMARY HAZARD INDEX	0.007	
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CON-SB2I(CT)
INCIDENTAL INGESTION OF AND DERMAL CONTACT WITH SUBSURFACE SOIL - CENTRAL TENDENCY
FUTURE CONSTRUCTION WORKER
AOC 57 AREA 2 INDUSTRIAL
FORT DEVENS, MA

14-Mar-00

#### EXPOSURE PARAMETERS

PARAMETER	SYMBOL	VALUE	UNITS			Γ_
CONCENTRATION SOIL	S	See Below*	mg/kg	CANCER RISK = INTAKE (mg/kg-day) x	CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR (mg/kg-day)-1	
INGESTION RATE	R	480	mg/day			
FRACTION INGESTED	Ħ	%001		HAZARD QUOTIENT = INTAKE (mg/kg-day) / REFERENCE DOSE (mg/kg-day)	;-day) / REFERENCE DOSE (mg/kg-day)	
SOIL ADHERENCE FACTOR	SAF	0.28	mg/cm²			
SURFACE AREA	SA	5200	cm³			
CONVERSION FACTOR	C.	0.000001	kg/mg	INTAKE = (INTAKE-INGESTION) + (INTAKE-DERMAL)	TAKE-DERMAL)	
BODY WEIGHT	BW	70	gÅ			_
EXPOSURE FREQUENCY	EF	250	days/year	INTAKE-INGESTION = CS x IR	CS x IR x FI x CF x EF x ED	
EXPOSURE DURATION	Œ	0.25	years	BW	BW x AT x 365 days/yr	_
AVERAGING TIME						_
CANCER	AT	70	years	INTAKE-DERMAL = CS x SA x S	CS x SA x SAF x AE x CF x EF x ED	_
NONCANCER	AT	0.25	years	BW x	BW x AT x 365 days/yr	
DERMAL ABSORPTION	AE	Chemical-specific	unitless			
EFFICIENCY						
Notes:						
For noncarcinogenic effects: AT = ED						
The dermal absorption efficiency is from the Risk Assessment Guidance for Superfund Volume 1:	sk Assessment Guidance	for Superfund Volume 1:				
Human Health Evaluation Manual Supplemental Guidance Dernal Risk Assessment, 1998.	1 Guidance Dermal Risk	Assessment, 1998.				
*The lesser of the 95 % upper confidence limit (UCL) & maximum concentration.	(UCL) & maximum con	centration.				
ND = Value not determined						
						i

CON-SB2I(CT)
INCIDENTAL INGESTION OF AND DERMAL CONTACT WITH SUBSURFACE SOIL - CENTRAL TENDENCY
FUTURE CONSTRUCTION WORKER

AOC 57 AREA 2 INDUSTRIAL FORT DEVENS, MA

#### CARCINOGENIC EFFECTS

ERCENT TOTAL RUSK	100.00%	
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	2.7E-07	3E-07
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# NONCARCINOGENIC EFFECTS

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Arsenic	78.6	4.6E-05	0.03	4.2E-06	3.0E-04	2.9E-04	1.5E-01	1.5E-02	1.7E-01	91.33%
Iron	0808	3.8E-02	QN	0.0E+00	ΩN	QN				
Manganese	231	1.1E-03	QN	0.0E+00	7.1E-02	4.30E-03	1.5E-02	0.0E+00	1.5E-02	8.25%
VPH										
C9-C12 Aliphatics	0.57	2.7E-06	0.17	1.4E-06	6.0E+00	5.5E+00	4.5E-07	2.5E-07	7.0E-07	0.0004%
C9-C10 Aromatics	0.41	1.9E-06	0.17	9.9E-07	3.0E-01	2.7E-01	6.4E-06	3.7E-06	1.0E-05	0.01%
ЕРН									•	
C9-C18 Aliphatics	8.2	3.9E-05	0.17	2.0E-05	6.0E+00	5.5E+00	6.4E-06	3.6E-06	1.0E-05	0.01%
C19-C36 Aliphatics	101	4.7E-04	0.17	2.4E-04	6.0E+01	5.5E+01	7.9E-06	4.4E-06	1.2E-05	0.01%
C11-C22 Aromatics	31	1.5E-04	0.17	7.5E-05	3.0E-01	2.7E-01	4.9E-04	2.5E-04	7.4E-04	0.40%
				SUMMARY	SUMMARY HAZARD INDEX	X	7.0	10:0	0.2	

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CON-SBZI(CT)
INHALATION EXPOSURE TO PARTICULATES IN SUBSURFACE SOIL - CENTRAL TENDENCY
FUTURE CONSTRUCTION WORKER
AOC 57 AREA 2 INDUSTRIAL
FORT DEVENS, MA

14-Mar-00

**EXPOSURE PARAMETERS** 

EQUATIONS

	CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR (mg/kg-day)-1		HAZARD QUOTIENT ~ INTAKE (mg/kg-day) / REFERENCE CONCENTRATION (mg/kg-day)			INTAKE - INHALATION = $(CAp + Cav) \times RAF \times IhR \times ET \times EF \times ED$	BW x AT x 365 days/yr			AIR CONCENTRATION PARTICULATES = CS x 1/PEF		AIR CONCENTRATION VOLATILES = CS x 1/VF	(VF not calculated because there are no VOCs selected as CPCs).					
SE SE	mg/kg	mg/m³	mg/m³	m³/kg	ug/m³	m³/hour	kg	hours/day	days/year	years		•	years	years				
VALUE	See below	Calculated	Calculated	Calculated	1.32E+09	3.3	70	80	250	0.25	100%		70	0.25	maximum concentration			
SYMBOE	cs	CAp	CAv	VF	PEF	IhR	BW	ET	#3	Œ	RAF		AT	AT	confidence limit (UCL) &	al concern.		
PARAWETER	CONCENTRATION SOIL*	CONCENTRATION AIR PARTICULATES	CONCENTRATION AIR VOLATILES	VOLATILIZATION FACTOR**	PARTICULATE EMISSIONS FACTOR	INHALATION RATE	BODY WEIGHT	EXPOSURE TIME	EXPOSURE FREQUENCY	EXPOSURE DURATION	RELATIVE ABSORPTION FACTOR	AVERAGING TIME	CANCER	NONCANCER	Notes: * Soil concentration used is the lesser of the 95 % upper confidence limit (UCL) &	**Volatilization factor used only for volatile chemicals of potential concern.	For noncarcinogenic effects: AT = ED	ND = Value not determined

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CON-SB2I(CT)
INHALATION EXPOSURE TO PARTICULATES IN SUBSURFACE SOIL - CENTRAL TENDENCY
FUTURE CONSTRUCTION WORKER
AOC 57 AREA 2 INDUSTRIAL
FORT DEVENS, MA

#### CARCINOGENIC EFFECTS

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COMPONIAB	SOR. CONCENTRATION (mg/kg)	у.r. (m ⁴ kg)	AIR.CONCENTIRATION VOLATILES FARTIC (mg/m²) (mg/m²)	ul.ATES	INTAKE (mg/kg-day):	REFERENCE DOSE (mg/kg-day)	HAZARD	PERCENT TOTAL RISK
Arsenic	78.6	NA		7.5E-09	1.9E-09	QN		
Iron	8080			6.1E-06	1.6E-06	QN		
Manganese	231	NA		1.8E-07	4.5E-08	1.4E-05	3.2E-03	100.00%
VPH				•				
C9-C12 Aliphatics	0.57	ZA		4.3E-10	1.1E-10	5.7E+00	2.0E-11	0.000001%
C9-C10 Aromatics	0.41	NA.		3.1E-10	8.0E-11	1.7E-01	4.7E-10	
ЕРН				•				
C9-C18 Aliphatics	8.2	NA		6.2E-09	1.6E-09	5.7E+00	2.8E-10	•
C19-C36 Aliphatics	101			7.7E-08	2.0E-08	QN		
C11-C22 Aronatics	31	NA		2.3E-08	6.1E-09	2.0E-01	3.0E-08	0.001%
					SUMMARY	SUMMARY HAZARD INDEX	0.003	

SS21

INCIDENTAL INGESTION OF AND DERMAL CONTACT WITH SURFACE SOIL - RME UNRESTRICTED LAND USE - ADULT RESIDENT AOC 57 AREA 2 INDUSTRIAL FORT DEVENS, MA

14-Mar-00

August 1992

EXPOSURE PARAMETERS

CONCENTRATION SOIL	S	See Below*	mg/kg	CANCER RISK = INTAKE	CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR (mg/kg-day)-1	
INGESTION RATE	R	001	mg/day			
FRACTION INGESTED	E	100%		HAZARD QUOTIENT = IN	HAZARD QUOTIENT = INTAKE (mg/kg-day) / REFERENCE DOSE (mg/kg-day)	
SOIL ADHERENCE FACTOR	SAF	80:0	mg/cm²			
SURFACE AREA EXPOSED	SA	2,800	CITT ²	INTAKE = (INTAKE-INGE	INTAKE = (INTAKE-INGESTION) + (INTAKE-DERMAL)	
CONVERSION FACTOR	t)	0.000001	kg/mg			
BODY WEIGHT	BW	70	kg	INTAKE-INGESTION =	CS x IR x FI x CF x EF x ED	
EXPOSURE FREQUENCY	뮴	150	days/year		BW x AT x 365 days/yr	
EXPOSURE DURATION	ED	24	years			
AVERAGING TIME				INTAKE-DERMAL =	CS x SA x SAF x AE x CF x EF x ED	
CANCER	AT	02	years		BW x AT x 365 days/yr	
NONCANCER	AT	24	years			
DERMAL ABSORPTION	AE	Chemical-specific	unitless			
EFFICIENCY						
Notes:						
For noncarcinogenic effects: AT = ED				-		
The dermal absorption efficiency is from the Risk Assessment Guidance for Superfund Volume I:	isk Assessment Guidance	for Superfund Volume I:				
Human Health Evaluation Manual Supplemental Guidance Demal Risk Assessment, 1998.	al Guidance Dermal Risk	Assessment, 1998.				
r confidence lin	(UCL.) & maximum conc	zentration.				
ND = Value not determined	NE = Route not evaluated					-

RES-SS21
INCIDENTAL INGESTION OF AND DERMAL CONTACT WITH SURFACE SOIL - RME UNRESTRICTED LAND USE - ADULT RESIDENT
AOC 57 AREA 2 INDUSTRIAL
FORT DEVENS, MA

### CARCINOGENIC EFFECTS

PERCENT TOTAL RISK	7.3E-06 100.00%	
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Arsenic	CONCENTRATION (mg/kg)	INGESTION (mg/kg-day)	ABSORPTION EFFICENCY	DERMAL (ng/kg-dby)	ORAL DERM ORAL DERM (mg/kg-day) (mg/kg-	DERMAL (mg/kg-day)	OUOTIENT INGESTION	QUOTIENT DERMAL	HAZARD QUOTTENT	PERCENT TOTAL RISK
	17	1.2E-05	0.03	1.7E-06	3.0E-04	2.9E-04	4.1E-02	5.9E-03	4.7E-02	37.90%
Chromium	27	1.6E-05	QN		3.0E-03	QX	5.3E-03		5.3E-03	4.26%
Iron	16,400	9.6E-03	QN		QN	QN				
Manganese	481	2.8E-04	QN		7.1E-02	QN	4.0E-03		4.0E-03	3.21%
VPH										
C9-C12 Aliphatics	32	1.9E-05	0.17	1.5E-05	6.0E-01	5.5E-01	3.1E-05	2.7E-05	5.8E-05	0.05%
C9-C10 Aromatics	23	1.4E-05	0.17	1.1E-05	3.0E-02	2.7E-02	4.5E-04	3.9E-04	8.4E-04	0.68%
ЕРН										
C9-C18 Aliphatics	465	2.7E-04	0.17	2.2E-04	6.0E-01	5.5E-01	4.5E-04	3.9E-04	8.5E-04	0.68%
C19-C36 Aliphatics	2,680	3.3E-03	0.17	2.6E-03	6.0E+00	5.5E+00	5.6E-04	4.8E-04	1.0E-03	0.83%
C11-C22 Aromatics	1770	1.0E-03	0.17	8.2E-04	3.0E-02	2.7E-02	3.5E-02	3.0E-02	6.5E-02	52.39%

INHALATION EXPOSURE TO PARTICULATES IN SURFACE SOIL - RME UNRESTRICTED LAND USE - ADULT RESIDENT AOC 57 AREA 2 INDUSTRIAL FORT DEVENS, MA RES-SS21

EXPOSURE PARAMETERS

PARAMETER	SYMBOL	VALUE	UNITS	
CONCENTRATION SOIL*	S	See below	mg/kg	CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR (mg/kg-day)-1
CONCENTRATION AIR PARTICULATES	CAp	Calculated	mg/m³	
CONCENTRATION AIR VOLATILES	CAv	Calculated	mg/m³	HAZARD QUOTIENT = INTAKE (mg/kg-day) / REFERENCE CONCENTRATION (mg/kg-day)
VOLATILIZATION FACTOR**	VF	Calculated	m³/kg	
PARTICULATE EMISSIONS FACTOR	PEF	1.32E+09	ug/m³	
INHALATION RATE	IhR	0.63	m³/hour	INTAKE - INHALATION = $(CAD + Cav) \times RAF \times INR \times ET \times EF \times ED$
BODY WEIGHT	BW	02	kg	BW x AT x 365 days/yr
EXPOSURE TIME	ET	80	hours/day	
EXPOSURE FREQUENCY	EF	150	days/year	
EXPOSURE DURATION	a	24	years	AIR CONCENTRATION PARTICULATES = CS x 1/PEF
RELATIVE ABSORPTION FACTOR	RAF	100%		
AVERAGING TIME				AIR CONCENTRATION VOLATILES = CS x 1/VF
CANCER	AT	70	years	(VF not calculated because there are no VOCs selected as CPCs).
NONCANCER	AT	24	years	
Notes: * Soil concentration used is the lesser of the 95 % upper confidence limit (UCL) & maxim	confidence limit (UCL) & max	cimum concentration		
**Volatilization factor used only for volatile chemicals of potential concern.	ial concern.			
For noncarcinogenic effects: AT = ED				
ND = Value not determined				



RES-SS21 INHALATION EXPOSURE TO PARTICULATES IN SURFACE SOIL - RME UNRESTRICTED LAND USE - ADULT RESIDENT AOC 57 AREA 2 INDUSTRIAL FORT DEVENS, MA

#### CARCINOGENIC EFFECTS

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SOUL CONCENTRATICIN VE (mg/kg) (m²/kg)	21	27	
SOUL CONCENTRATION VE (mg/kg) (m²/kg)	21	27	
SOIL CONCENTRATION VE (mgkg) (m²/kg)	21	27	
SOUL CONCENTRATICIN VE (mg/kg) (m²/kg)	21	27	
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SOUL COMPOUND CONCENERATION VE (mg/kg) (m7/kg)	21	27	
SOUL COMPULIND CONCENTRATION VE (INSK\$)	21	27	
SOUL COMPUIND CONCENTIAGN VF (mg/kg) (mg/kg)	21		
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#### PAGES 3+4 ARE MISSING IN ORIGINAL **DOCUMENT**

INCIDENTAL INGESTION OF AND DERMAL CONTACT WITH SURFACE SOIL - RME UNRESTRICTED LAND USE - CHILD RESIDENT (1 TO 6 YEARS)
AOC 57 AREA 2 INDUSTRIAL
FORT DEVENS, MA

14-Mar-00

## EXPOSURE PARAMETERS

PARAMETER	SYMBOL	VALUE	UNITS		-
CONCENTRATION SOIL	S	See Below*	mg/kg	CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR (mg/kg-day)-1	ACTOR (mg/kg-day)-1
INGESTION RATE	R	200	mg/day		
FRACTION INGESTED	田	%001		HAZARD QUOTIENT = INTAKE (mg/kg-day) / REFERENCE DOSE (mg/kg-day)	DOSE (mg/kg-day)
SOIL ADHERENCE FACTOR	SAF	-	mg/cm²		
SURFACE AREA EXPOSED	SA	2,045	Cilling	INTAKE = (INTAKE-INGESTION) + (INTAKE-DERMAL)	
CONVERSION FACTOR	C.	0.000001	kg/mg		
BODY WEIGHT	BW	15	kg	INTAKE-INGESTION = $\frac{CS \times IR \times FI \times CF \times EF \times ED}{}$	
EXPOSURE FREQUENCY	H	150	days/year	BW x AT x 365 days/yr	
EXPOSURE DURATION	ED	9	years		
AVERAGING TIME				INTAKE-DERMAL = CS x SA x SAF x AE x CF x EF x ED	<u>a</u>
CANCER	AT	70	years	BW x AT x 365 days/yr	
NONCANCER	TA	9	years		
DERMAL ABSORPTION	AE	Chemical-specific	unitless		•
EFFICIENCY					
Notes:					
For noncarcinogenic effects: AT = ED					
The dermal absorption efficiency is from the Risk Assessment Guidance for Superfund Volume I:	lisk Assessment Guidance	for Superfund Volume I:			••,
Human Health Evaluation Manual Supplemental Guidance Dermal Risk Assessment, 1998.	tal Guidance Dermal Risk	Assessment, 1998.			
*The lesser of the 95 % upper confidence limit (UCL) & maximum concentration.	t (UCL) & maximum conc	entration.			
ND = Value not determined N	NE = Route not evaluated				

RES-SS21 INCIDENTAL INGESTION OF AND DERMAL CONTACT WITH SURFACE SOIL - RME UNRESTRICTED LAND USE - CHILD RESIDENT (1 TO 6 YEARS) AOC 57 AREA 2 INDUSTRIAL FORT DEVENS, MA

### CARCINOGENIC EFFECTS

PERCENT TOTAL RISK	100.00%	
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CANCER SLOPE ORAL (mg/kg-day)-1		SUMMARY CANCER RISK
INTAKE DERMAL (ng/kg-dny)	3.0E-06	
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COMPOUND	CONCENTRATION (mg/kg)	INGESTION (mg/kg-day)	ABSORPTION EFFICTENCY	DERMAL (mg/kg-day)	ORAL DERM (mg/kg-day) (mg/kg-	DERNIAL (mg/kg-day)	QUOTIENT RAGESTION	QUOTIENT DERMAL	HAZARD QUOTTENT	TOTAL RISK
Arsenic	21	1.2E-04	0.03	3.5E-05	3.0E-04	2.9E-04	3.8E-01	1.2E-01	5.1E-01	31.98%
Chronium	27	1.5E-04	Q		3.0E-03	ND	4.9E-02		4.9E-02	3.12%
Iron	16,400	9.0E-02	ΩN		ND	Q				
Manganese	481	2.6E-03	QN		7.1E-02	Q	3.7E-02		3.7E-02	2.35%
VPH			-	•						
C9-C12 Aliphatics	32	1.8E-04	0.17	3.0E-04	6.0E-01	5.5E-01	2.9E-04	5.5E-04	8.5E-04	0.05%
C9-C10 Aronatics	23	1.3E-04	0.17	2.2E-04	3.0E-02	2.7E-02	4.2E-03	8.1E-03	1.2E-02	0.78%
ЕРН										
C9-C18 Aliphatics	465	2.5E-03	0.17	4.4E-03	6.0E-01	5.5E-01	4.2E-03	8.1E-03	1.2E-02	0.78%
C19-C36 Aliphatics	2,680	3.1E-02	0.17	5.4E-02	6.0E+00	5.5E+00	5.2E-03	9.8E-03	1.5E-02	0.95%
C11-C22 Aronatics	1770	9.7E-03	0.17	1.7E-02	3.0E-02	2.7E-02	3.2E-01	6.2E-01	9.5E-01	29.98%

RES-SS21 INHALATION EXPOSURE TO PARTICULATES IN SURFACE SOIL - RME UNRESTRICTED LAND USE - CHILD RESIDENT (1 TO 6 YEARS) AOC 57 AREA 2 INDUSTRIAL FORT DEVENS, MA

## EXPOSURE PARAMETERS

EQUATIONS

PARAMETER	SYMBOL	VALUE	CNITS	
CONCENTRATION SOIL*	S	See below	mg/kg	CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR (mg/kg-day)+1
CONCENTRATION AIR PARTICULATES	CAp	Calculated	mg/m³	
CONCENTRATION AIR VOLATILES	CAv	Calculated	mg/m³	HAZARD QUOTIENT = INTAKE (mg/kg-day) / REFERENCE CONCENTRATION (mg/kg-day)
VOLATILIZATION FACTOR**	VF	Calculated	m³/kg	
PARTICULATE EMISSIONS FACTOR	PEF	1.32E+09	ug/m³	
INHALATION RATE	IhR	0.31	m³/hour	INTAKE - INHALATION = $(CA_D + Ca_V) \times RAF \times IhR \times ET \times EF \times ED$
BODY WEIGHT	BW	\$1	kg	BW x AT x 365 daystyr
EXPOSURE TIME	ET	00	hours/day	
EXPOSURE FREQUENCY	EF	120	days/year	
EXPOSURE DURATION	ED	9	years	AIR CONCENTRATION PARTICULATES = CS x 1/PEF
RELATIVE ABSORPTION FACTOR	RAF	%001		
AVERAGING TIME				AIR CONCENTRATION VOLATILES = CS x 1/VF
CANCER	AT	02	years	(VF not calculated because there are no VOCs selected as CPCs).
NONCANCER	AT	9	years	
Notes: * Soil concentration used is the lesser of the 95 % upper confidence limit (UCL) & maximum concentration	confidence limit (UCL) & max	ximum concentration		
**Volatilization factor used only for volatile chemicals of potential concern.	ial concern.			
For noncarcinogenic effects: AT = ED	,			
ND = Value not determined				

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RES-SS21 INHALATION EXPOSURE TO PARTICULATES IN SURFACE SOIL - RME UNRESTRICTED LAND USE - CHILD RESIDENT (1 TO 6 YEARS) AOC 57 AREA 2 INDUSTRIAL FORT DEVENS, MA

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2.0E-08     1.4E-09     2.9E-05     4.8E-05       1.2E-05     8.4E-07     ND       3.6E-07     2.5E-08     1.4E-05     1.8E-03       2.4E-08     1.6E-09     5.7E-01     2.9E-09     0.00       1.7E-08     1.2E-09     1.7E-02     7.0E-08     0.0       3.5E-07     2.4E-08     5.7E-01     4.2E-08     0.0       4.3E-06     2.9E-07     ND     4.6E-06     0.0       1.3E-06     9.1E-08     2.0E-02     4.6E-06     0.0
1.2E-05 8.4E-07 ND 3.6E-07 3.6E-07 3.6E-07 2.5E-08 1.4E-05 1.8E-03 1.8E-03 3.5E-07 2.4E-08 1.2E-09 1.7E-02 7.0E-08 0 4.3E-06 2.9E-07 ND ND 1.3E-06 1.3E-06 9.1E-08 2.0E-02 4.6E-06
3.6E-07 2.5E-08 1.4E-05 1.8E-03 0.05 2.4E-08 1.6E-09 1.7E-09 1.7E-09 1.7E-09 1.7E-09 1.7E-09 1.7E-09 3.5E-07 2.4E-08 5.7E-01 4.2E-08 0 4.3E-06 1.3E-06 9.1E-08 2.0E-02 4.6E-06
2.4E-08       1.6E-09       5.7E-01       2.9E-09       0         1.7E-08       1.2E-09       1.7E-02       7.0E-08         3.5E-07       2.4E-08       5.7E-01       4.2E-08         4.3E-06       2.9E-07       ND       4.6E-06         1.3E-06       9.1E-08       2.0E-02       4.6E-06
2.4E-08       1.6E-09       5.7E-01       2.9E-09       0         1.7E-08       1.2E-09       1.7E-02       7.0E-08         3.5E-07       2.4E-08       5.7E-01       4.2E-08         4.3E-06       2.9E-07       ND       4.6E-06         1.3E-06       9.1E-08       2.0E-02       4.6E-06
1.7E-08       1.2E-09       1.7E-02       7.0E-08       0         3.5E-07       2.4E-08       5.7E-01       4.2E-08       6         4.3E-06       2.9E-07       ND       4.6E-06         1.3E-06       9.1E-08       2.0E-02       4.6E-06
3.5E-07 2.4E-08 5.7E-01 4.2E-08 4.3E-06 2.9E-07 ND 1.3E-06 9.1E-08 2.0E-02 4.6E-06
3.5E-07 2.4E-08 5.7E-01 4.2E-08 4.3E-06 2.9E-07 ND ND 1.3E-06 9.1E-08 2.0E-02 4.6E-06
4.3E-06 2.9E-07 ND 1.3E-06 9.1E-08 2.0E-02 4.6E-06
1.3E-06 9.1E-08 2.0E-02 4.6E-06
SIMMABYHAZABDINDEX

UNRESTRICTED LAND USE - ADULT RESIDENT
AOC 57 AREA 2 INDUSTRIAL
FORT DEVENS, MA

03-Feb-00

August 1992

EXPOSURE PARAMETERS

EQUATIONS

2					
	క	See Below*	mg/kg	CANCER RISK = INTAKE	CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR (mg/kg-day)-1
	~	100	mg/day		
	E.	100%		HAZARD QUOTIENT = IN	HAZARD QUOTIENT = INTAKE (mg/kg-day) / REFERENCE DOSE (mg/kg-day)
	AF	0.08	mg/cm²		
SURFACE AREA EXPOSED SA	Α.	2,800	cm²	INTAKE = (INTAKE-INGE	INTAKE = (INTAKE-INGESTION) + (INTAKE-DERMAL)
CONVERSION FACTOR CF	<u>F</u>	0.000001	kg/mg		
BODY WEIGHT BW	*	0,4	kg	INTAKE-INGESTION =	CS x IR x FI x CF x EF x ED
EXPOSURE FREQUENCY BI	EF	150	days/year		BW x AT x 365 days/yr
EXPOSURE DURATION EI	ED	24	years		
AVERAGING TIME				INTAKE-DERMAL =	CS x SA x SAF x AE x CF x EF x ED
CANCER AT	-	70	years		BW x AT x 365 days/yr
NONCANCER AT	AT	24	years		
DERMAL ABSORPTION AF	AE	Chemical-specific	unitless		
EFFICIENCY					
Notes:					
For noncarcinogenic effects: AT = ED					
Ē	ent Guidance fe	Risk Assessment Guidance for Superfund Volume I:			
Human Health Evaluation Manual Supplemental Guidance Dermal Risk Assessment, 1998.	Dermal Risk A	ssessment, 1998.			
*The lesser of the 95 % upper confidence limit (UCL) & maximum concentration.	ахітит сопсе	ntration.			
ND = Value not determined NE = Route not evaluated	not evaluated				

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INCIDENTAL INGESTION OF AND DERMAL CONTACT WITH SUBSURFACE SOIL - RME UNRESTRICTED LAND USE - ADULT RESIDENT AOC 57 AREA 2 INDUSTRIAL FORT DEVENS, MA

CARCINOGENIC EFFECTS

	3.4E-06 100.00%	
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INTAKE DERMAL (mg/kg-day)	2.8E-07	
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	SOIL: CONCENTRATION I (mg/kg)	INTAKE INGESTION (mg/kg-day)	DERMAL ABSORPTION EFFICTENCY	INTAKE BERMAL (mg/kg-day)	REFERENCE DOSE ORAL DERN (mg/kg-day) (mg/kg	CE DOSE DERMAL (ng/kg-day)	HAZARD QUOTIENT INGESTION	HAZARD QUOTIENT DERMAL	TOTAL HAZARD QUOTTENT	PERCENT TOTAL RISK
Arsenic	78.6	5.8E-06	0.03	8.1E-07	3.0E-04	2.9E-04	1.9E-02	2.8E-03	2.2E-02	87.70%
Iron	8080	4.7E-03	QN	•	QX	ΩN				
Manganese	231	1.4E-04	QN		7.1E-02	4.3E-03	1.9E-03	0.0E+00	1.9E-03	7.58%
HĀĀ										
C9-C12 Aliphatics	0.57	3.3E-07	0.17	2.6E-07	6.0E-01	5.5E-01	5.6E-07	4.8E-07	1.0E-06	0.004%
C9-C10 Aromatics	0.41	2.4E-07	0.17	1.9E-07	3.0E-02	2.7E-02	8.0E-06	7.0E-06	1.5E-05	%90.0
EPH										
C9-C18 Aliphatics	8.2	4.8E-06	0.17	3.8E-06	6.0E-01	5.5E-01	8.0E-06	6.9E-06	1.5E-05	%90.0
C19-C36 Aliphatics	101	5.9E-05	0.17	4.7E-05	6.0E+00	5.5E+00	9.9E-06	8.5E-06	1.8E-05	0.07%
C11-C22 Aromatics	31	1.8E-05	0.17	1.4E-05	3.0E-02	2.7E-02	6.1E-04	5.3E-04	1.1E-03	4.52%
				SUMMARY	SUMMARY HAZARD INDEX	_	0.02	\$00.0	0.03	

RES-SBZI INHALATION EXPOSURE TO PARTICULATES IN SUBSURFACE SOIL - RME UNRESTRICTED LAND USE - ADULT RESIDENT AOC 57 AREA 2 INDUSTRIAL FORT DEVENS, MA

EXPOSURE PARAMETERS

	CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR (mg/kg-day)-1		HAZARD QUOTIENT = INTAKE (mg/kg-day) / REFERENCE CONCENTRATION (mg/kg-day)			INTAKE - INHALATION = $(CAD + Cav) \times RAF \times IhR \times ET \times EF \times ED$	BW x AT x 365 days/yr			AIR CONCENTRATION PARTICULATES = CS x 1/PEF		AIR CONCENTRATION VOLATILES = $CS \times 1/VF$	(VF not calculated because there are no VOCs selected as CPCs).					
	CANC		HAZA			INTAL				AIRC		AIRC	(VF no		Ī	_		
UNITS	mg/kg	mg/m³	mg/m³	m³/kg	ug/m³	m³/hour	kg	hours/day	days/year	years			years	years				
VALUE	See below	Calculated	Calculated	Calculated	1.32E+09	0.63	0/	∞	150	34	100%	_	70	24	um concentration			
	_	_													L) & maxim			
SYMBOL	S	CAp	CAv	VF	PEF	IhR	BW	ET	EF	ED	RAF		AT	AT	fidence limit (UC	опсета.		
Parameter	CONCENTRATION SOIL*	CONCENTRATION AIR PARTICULATES	CONCENTRATION AIR VOLATILES	VOLATILIZATION FACTOR**	PARTICULATE EMISSIONS FACTOR	INHALATION RATE			EXPOSURE FREQUENCY	EXPOSURE DURATION	RELATIVE ABSORPTION FACTOR	AVERAGING TIME	CANCER	NONCANCER	Notes: * Soil concentration used is the lesser of the 95 % upper confidence limit (UCL) & maximum concentration	**Volatilization factor used only for volatile chemicals of potential concern.	For noncarcinogenic effects: AT = ED	ND = Value not determined

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RES-SB21 INHALATION EXPOSURE TO PARTICULATES IN SUBSURFACE SOIL - RME UNRESTRICTED LAND USE - ADULT RESIDENT AOC 57 AREA 2 INDUSTRIAL FORT DEVENS, MA

#### CARCINOGENIC EFFECTS

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COMFOUND	SOE CONCENTRATION (mg/kg)	VF ((a*7kg)	AIR CONCENTRATION VOLATILES PARTIC (mg/m²) (mg/m²)	FIRATION FARTICULATES INTAKE (mg/kg-flay)	INTAKE mg/kg-day)	REFERENCE DOSE (mg/kg-day)	HAZARD QUOTIENT	PERCENT TOTAL RISK
Arsenic	78.6	AN		7.5E-09	2.2E-10	QN		
Iron	8080	AN		6.1E-06	1.8E-07	QN		
Manganese	231	A'N		1.8E-07	5.2E-09	1.4E-05	3.7E-04	%66'66
VPH								
C9-C12 Aliphatics	0.57	ΑΝ		4.3E-10	1.3E-11	5.7E-01	2.2E-11	0.000006%
C9-C10 Aromatics	0.41	Ϋ́		3.1E-10	9.2E-12	1.7E-02	5.4E-10	0.0001%
EPH								
C9-C18 Aliphatics	8.2	¥Z		6.2E-09	1.8E-10	5.7E-01	3.2E-10	0.00009%
C19-C36 Aliphatics	101	Ϋ́		7.7E-08	2.3E-09	QN		
C11-C22 Aromatics	31	Y X		2.3E-08	6.9E-10	2.0E-02	3.5E-08	0.009%
					SUMMARY	SUMMARY HAZARD INDEX	0.0004	

INCIDENTAL INGESTION OF AND DERMAL CONTACT WITH SUBSURFACE SOIL - RME UNRESTRICTED LAND USE - CHILD RESIDENT (I TO 6 YEARS)
AOC 57 AREA 2 INDUSTRIAL FORT DEVENS, MA

### EXPOSURE PARAMETERS

ALUE	See Below* mg/kg CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR (mg/kg-day)-1	200 mg/day	100% HAZARD QUOTIENT = INTAKE (mg/kg-day) / REFERENCE DOSE (mg/kg-day)	1 mg/cm²	2,045 cm ² INTAKE = (INTAKE-INGESTION) + (INTAKE-DERMAL)	0.000001 kg/mg	15 kg INTAKE-INGESTION = $\frac{CS \times IR \times FI \times CF \times EF \times ED}{CS \times IR \times FI \times CF \times ED}$	150 days/year BW x AT x 365 days/yr	6 years	INTAKE-DERMAL = $CS \times SA \times SAF \times AE \times CF \times EF \times ED$	70 years BW x AT x 365 days/yr	6 years	ical-specific unitless			und Volume I:	t, 1998.		
LINITS		mg/day	HAZARD QUO	mg/cm²		kg/mg		days/year	years	INTAKE-DERM	years	years	unitless						
VALUE	See Below*	200	%001		2,045	0.000001	51		9		92	9	Chemical-specific			or Superfund Volume I:	Assessment, 1998.	entration.	
SYMBOL	S	Ħ	FI	SAF	- SA	ర	BW	超	æ		AT	AT	AE			Risk Assessment Guidance for Superfund Volume I:	tal Guidance Dermal Risk A	t (UCL) & maximum conce	NE = Route not evaluated
PARAMETER	CONCENTRATION SOIL	INGESTION RATE	FRACTION INGESTED	SOIL ADHERENCE FACTOR	SURFACE AREA EXPOSED	CONVERSION FACTOR	BODY WEIGHT	EXPOSURE FREQUENCY	EXPOSURE DURATION	AVERAGING TIME	CANCER	NONCANCER	DERMAL ABSORPTION	EFFICIENCY	For noncarcinogenic effects: AT = ED	The dermal absorption efficiency is from the Ri	Human Health Evaluation Manual Supplemental Guidance Dermal Risk Assessment, 1998.	*The lesser of the 95 % upper confidence limit (UCL) & maximum concentration.	ND = Value not determined

RES-SB21 INCIDENTAL INGESTION OF AND DERMAL CONTACT WITH SUBSURFACE SOIL - RME UNRESTRICTED LAND USE - CHILD RESIDENT (1 TO 6 YEARS) AOC 57 AREA 2 INDUSTRIAL FORT DEVENS, MA

### CARCINOGENIC EFFECTS

PERCENT TOTAL KISK	9.2E-06 100.00%	
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INTAKE DERMAL (ing/kg-day)	1.4E-06	
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INTAKE DERMAL (mg/kg-day)		
DERMAL SSORFTION FFICIENCY	m	
DERMAL BSORPTION PFICIENCY	0.03	
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COMPOUND	SOIL CONCENTRATION (ng/kg)	INTAKE INGESTION (¤g/kg-d\$y)	DERMAL ABSORPTION EFFICIENCY	INTAKE DERMAL (mg/kg-dny)	REFERENCE DOST ORAL DERI (mg/kg-day) (mg/kg	CE DOSE DERNAL (mg/kg-tay)	HAZARD QUOTENT INGESTION	HAZARD QUOTIENT DERMAL	TOTAL HAZARD QUOTIENT	PERCENT TOTAL RISK
Arsenic	9.87	5.4E-05	0.03	1.7E-05	3.0E-04	2.9E-04	1.8E-01	5.7E-02	2.4E-01	87.11%
Iron	8080	4.4E-02	ND		QV.	QN				
Manganese	231	1.3E-03	ND		7.1E-02	4.3E-03	1.8E-02	0.0E+00	1.8E-02	6.54%
VPH						-				
C9-C12 Aliphatics	0.57	3.1E-06	0.17	5.4E-06	6.0E-01	5.5E-01	5.2E-06	9.9E-06	1.5E-05	0.006%
C9-C10 Aromatics	0.41	2.2E-06	0.17	3.9E-06	3.0E-02	2.7E-02	7.5E-05	1.4E-04	2.2E-04	0.08%
ЕРН										
C9-C18 Aliphatics	8.2	4.5E-05	0.17	7.8E-05	6.0E-01	5.5E-01	7.5E-05	1.4E-04	2.2E-04	0.08%
C19-C36 Aliphatics	101	5.5E-04	0.17	9.6E-04	6.0E+00	5.5E+00	9.2E-05	1.7E-04	2.7E-04	0.10%
C11-C22 Aromatics	31	1.7E-04	0.17	3.0E-04	3.0E-02	2.7E-02	5.7E-03	1.1E-02	1.7E-02	6.09%
				SUMMARY	SUMMARY HAZARD INDEX	X	2:0	1:0	6,3	

RES-SEL INHALATION EXPOSURE TO PARTICULATES IN SUBSURFACE SOIL - RME UNRESTRICTED LAND USE - CHILD RESIDENT (1 TO 6 YEARS) AOC 57 AREA 2 INDUSTRIAL FORT DEVENS, MA

### EXPOSURE PARAMETERS

EQUATIONS

	CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR (mg/kg-day)-1		HAZARD QUOTIENT = INTAKE (mg/kg-dny) / REFERENCE CONCENTRATION (mg/kg-dny)			INTAKE - INHALATION = $\frac{(C_{AB} + C_{AV})_x RAF \times IhR \times ET \times EE \times ED}{(C_{AB} + C_{AB})}$	BW x AT x 365 days/yr			AIR CONCENTRATION PARTICULATES = CS x 1/PEF		AIR CONCENTRATION VOLATILES = CS x 1/VF	(VF not calculated because there are no VOC3 selected as CPC3).					
UNITS	mg/kg	mg/m³	mg/m³	m³/kg	ug/m³	m²/hour	K'	hours/day	days/year	years			years	years	g.			
VALUE	See below	Calculated	Calculated	Calculated	1.32E+09	0.31	\$1	80	150	9	100%		20	9	maximum concentratio			
SYMBOL	ಬ	CAp	CAv	VF	PEF	IhR	BW	ET	EF	ED	RAF		AT	AT	confidence limit (UCL) &	ial concern.		
PARAMETER	CONCENTRATION SOIL*	CONCENTRATION AIR PARTICULATES	CONCENTRATION AIR VOLATILES	VOLATILIZATION FACTOR**	PARTICULATE EMISSIONS FACTOR	INHALATION RATE	BODY WEIGHT	EXPOSURE TIME	EXPOSURE FREQUENCY	EXPOSURE DURATION	RELATIVE ABSORPTION FACTOR	AVERAGING TIME	CANCER	NONCANCER	Notes: * Soil concentration used is the lesser of the 95 % upper confidence limit (UCL) & maximum concentration	**Volatilization factor used only for volatile chemicals of potential concern.	For noncarcinogenic effects: AT = ED	

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RES-SB21 INHALATION EXPOSURE TO PARTICULATES IN SUBSURFACE SOIL - RME UNRESTRICTED LAND USE - CHILD RESIDENT (1 TO 6 YEARS) AOC 57 AREA 2 INDUSTRIAL FORT DEVENS, MA

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	Arsenic	

ERCENT TOTAL RISK			%66.66		0.0000006%	0.0001%		0.00000%		%600.0	
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HAZARD Qeofient			8.5E-04		5.1E-11	1.2E-09		7.4E-10		8.0E-08	0.00
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S CE	Ð	S	1.4E-05		5.7E-01	1.7E-02		5.7E-01	ND	2.0E-02	NDEX
REFERENCE DOSE (mg/kg-dry)											ZARD
	0	-	<u>∞</u>			_		0	<u> </u>	<u>&amp;</u>	RV HA
(TAKE g-day)	5.1E-10	4.2E-07	1.2E-08		2.9E-11	2.1E-11		4.2E-10	5.2E-09	1.6E-09	SHMMARY
RATION PARTICULATES INTAKE (ng/m/s)		9	_		_	0		6	<u>~</u>		_ _
(TION ARTICULATES (mg/m²)	7.5E-09	6.1E-06	1.8E-07		4.3E-10	3.1E-10		6.2E-09	7.7E-08	2.3E-08	
ATTON ARTICI (mg/											
AIR CONCENTRATION ATELES PARTIC g/nt] (ng	$\vdash$										_
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VOLA (mg/											
	NA	NA A	A N		NA A	Y.		NA A	A'N	A'N	_
VE (m²/kg)	z	z	z		Z	z		z	z	z	
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TION	9.87	8080	231		0.57	0.41		8.2	101	31	
SOIL NCENTRATION (mg/kg)											
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COMPOUND											
8					tics	tics		tics	atics	atics	
			ese		Aliphat	C9-C10 Aronutics		C9-C18 Aliphatics	C19-C36 Aliphatics	C11-C22 Aromatics	
	Arsenic	lron	Manganese	VPH	29-C12	29-C10	EPH	29-C18	219-C3	211-C2	

RES-CW21 INGESTION OF GROUNDWATER AS DRINKING WATER (UNFILTERED SAMPLES) - RME UNRESTRICTED LAND USE - ADULT RESIDENT AOC 57 AREA 2 INDUSTRIAL FORT DEVENS, MA

#### EXPOSURE PARAMETERS

	CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR (mg/kg-day)-1		HAZARD QUOITIENT = INTAKE (mg/kg-day) / REFERENCE DOSE (mg/kg-day)			INTAKE - CWXIRXEFXEDXCF	BW x AT x 365 days/year					
HISTINITE	ug/liter	liters/day		gu/gm	days/year	years		years	years			
VALUE	chemical-specific	2	62	0.001	350	30		07	30			
SYAKBOU !!!!!!	CW	æ	BW	Ç	监	Œ		AT	AT			
	CONCENTRATION WATER	INGESTION RATE	BODY WEIGHT	CONVERSION FACTOR	EXPOSURE FREQUENCY	EXPOSURE DURATION	AVERAGING TIME	CANCER	NONCANCER	Notes:	For noncarcinogenic effects: AT = ED	



RES-CW21 INGESTION OF GROUNDWATER AS DRINKING WATER (UNFILTERED SAMPLES) - RME UNRESTRICTED LAND USE - ADULT RESIDENT AOC 57 AREA 2 INDUSTRIAL FORT DEVENS, MA

#### CARCINOGENIC EFFECTS

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CANCER RISK INCESTION		
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NCER SLC PACTOR ng/kg-day)*	i	
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INTAKE ENGESTION (mg/kg-day)		
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INTAKE INGESTION (INPAREJIAN)	03	TOTAL HAZARD INDEX
INTAKE INGESTION (INF/SE-12y)	5.6E-03 4.8E-03	182
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RECCH-SS2R INCIDENTAL INGESTION OF AND DERMAL CONTACT WITH SURFACE SOIL - RME CURRENT/FUTURE RECREATIONAL CHILD (6 TO 16 YEARS) AOC 57 AREA 2 RECREATIONAL FORT DEVENS, MA

14-Mar-00

EXPOSURE PARAMETERS

CONCENTRATION SOIL	SS	See Below*	mg/kg	CANCER RISK = INTAKE	CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR (mg/kg-day)-1	
INGESTION RATE	띪	100	mg/day			
FRACTION INGESTED	E	100%		HAZARD QUOTIENT = IN	HAZARD QUOTIENT = INTAKE (mg/kg-day) / REFERENCE DOSE (mg/kg-day)	
SOIL ADHERENCE FACTOR	SAF	_	mg/cm²			
SURFACE AREA EXPOSED	SA	3,850	cm³	INTAKE = (INTAKE-INGE)	INTAKE = (INTAKE-INGESTION) + (INTAKE-DERMAL)	
CONVERSION FACTOR	ţ,	0.000001	kg/mg			
BODY WEIGHT	BW	38	kg	INTAKE-INGESTION =	CS x IR x F1 x CF x EF x ED	
EXPOSURE FREQUENCY	ŦĦ	52	days/year		BW x AT x 365 days/yr	
EXPOSURE DURATION	ED	=	years			
AVERAGING TIME				INTAKE-DERMAL =	CS x SA x SAF x AE x CF x EF x ED	
CANCER	AT	70	years		BW x AT x 365 days/yr	
NONCANCER	AT	=	years			
DERMAL ABSORPTION	AE	Chemical-specific	unitless			
EFFICIENCY						
Notes:						
For noncarcinogenic effects: AT = ED						
The dermal absorption efficiency is from the Risk Assessment Guidance for Superfund Volume I:	k Assessment Guidance	for Superfund Volume I:				
Human Health Evaluation Manual Supplemental Guidance Dermal Risk Assessment, 1998.	Guidance Dermal Risk	Assessment, 1998.		-		
*The lesser of the 95 % upper confidence limit (UCL) & maximum concentration.	UCL) & maximum con	centration.				
ND = Value not determined						

RECCH-SS2R INCIDENTAL INGESTION OF AND DERMAL CONTACT WITH SURFACE SOIL - RME CURRENT/FUTURE RECREATIONAL CHILD (6 TO 16 YEARS) AOC 57 AREA 2 RECREATIONAL FORT DEVENS, MA

## CARCINOGENIC EFFECTS

ERCENT FOTAL RISK	%	25.78%	
ERCENT FOTAL RISK	5	5.7	
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	9.4E-06	3.3E-06	E:05
TOTAL CANCER RISK	Ε̈́-	Ä	Œ.
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CANCER RISK DERMAL	2.5	6.2	≆
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CANCER SLOPE FACTOR ORAL (MENE-44)>-1 (MENE-44)>-1			Ų
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CANCER SLC ORAL (mg/kg-day)-1	13.	7	Š.
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INTAKE BERMAL mg/kg-day): ((	3.3E-06	1.1E-06	
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DERMAL RESORPTION EFFICIENCY	1		
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CONFOUND	SOIL CONCENTRATION (mg/kg)	INTAKE INGESTION (mg/kg-døy)	DERMAL ABSORPTION EFFICEENCY	INTAKE DERMAL (mg/kg-day)	REFERENCE DOSE ORAL DERN (mg/kg-day) (mg/kg	E DOSE DERNAL (ng/kg-dey)	HAZARD QUOTIENT INGESTION	HAZARD QUOTIENT DERMAL	TOTAL HAZARD QUOTTENT	PERCENT TOTAL RISK
Arsenic	47.9	1.8E-05	0.03	2.1E-05	3.0E-04	2.9E-04	6.0E-02	7.2E-02	1.3E-01	16.91%
Iron	7920	3.0E-03	QN		QN.	QN				
Manganese	273	1.0E-04	QN		7.1E-02	QX	1.4E-03		1.4E-03	0.19%
Aroclor-1260	3.6	1.3E-06	0.14	7.3E-06	2.0E-05	1.6E-05	6.7E-02	4.5E-01	5.2E-01	67.20%
VPH										
C9-C12 Aliphatics	21	7.9E-06	0.17	5.2E-05	6.0E-01	5.5E-01	1.3E-05	9.4E-05	1.1E-04	0.01%
C9-C10 Aromatics	11	6.4E-06	0.17	4.2E-05	3.0E-02	2.7E-02	2.1E-04	1.5E-03	1.8E-03	0.23%
ЕРН					•					
C9-C18 Aliphatics	298	1.1E-04	0.17	7.3E-04	6.0E-01	5.5E-01	1.9E-04	1.3E-03	1.5E-03	0.20%
C19-C36 Aliphatics	3640	1.4E-03	0.17	8.9E-03	6.0E+00	5.5E+00	2.3E-04	1.6E-03	1.9E-03	0.24%
C11-C22 Aromatics	1,130	4.2E-04	0.17	2.8E-03	3.0E-02	2.7E-02	1.4E-02	1.0E-01	1.2E-01	15.03%
					And the second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second s			N. 2000 1000 1000 1000 1000 1000 1000 100	G. C. C. C. C. C. C. C. C. C. C. C. C. C.	

RECCH-SD2R
INCIDENTAL INGESTION OF AND DERMAL CONTACT WITH SEDIMENT - RME
CURRENT/FUTURE RECREATIONAL CHILD (6-16 YEARS)
AOC 57 AREA 2 RECREATIONAL
FORT DEVENS, MA

14-Mar-00

### EXPOSURE PARAMETERS

PARAMETER	SYMBÖL	VALUE	UNITS		
CONCENTRATION SEDIMENT	SS	See Below*	mg/kg	CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR (mg/kg-day)-1	OPE FACTOR (mg/kg-day)-1
INGESTION RATE	ĸ	25	mg/day		
FRACTION INGESTED	E	100%		HAZARD QUOTIENT = INTAKE (mg/kg-day) / REFERENCE DOSE (mg/kg-day)	RENCE DOSE (mg/kg-day)
SOIL ADHERENCE FACTOR	SAF	-	mg/cm³		
SURFACE AREA EXPOSED	SA	3,850	cm³	INTAKE = (INTAKE-INGESTION) + (INTAKE-DERMAL)	(AL)
CONVERSION FACTOR	ភ	0.000001	kg/mg		
BODY WEIGHT	BW	38	kg	INTAKE-INGESTION = CS x IR x FI x CF x EF x ED	FxED
EXPOSURE FREQUENCY	品	52	days/year	BW x AT x 365 days/yr	s/yr
EXPOSURE DURATION	ED	=	years		
AVERAGING TIME				$NTAKE-DERMAL = CS \times SA \times SAF \times AE \times CF \times EF \times ED$	x EF x ED
CANCER	AT	70	years	BW x AT x 365 days/yr	s/yr
NONCANCER	AT	=	years		
DERMAL ABSORPTION	AE	Chemical-specific	unitless		
EFFICIENCY					
Notes:					
For noncarcinogenic effects: AT = ED					
The dermal absorption efficiency is from the Risk Assessment Guidance for Superfund Volume I:	isk Assessment Guidance	for Superfund Volume I:			
Human Health Evaluation Manual Supplemental	al Guidance Dermal Risk Assessment, 1998.	Assessment, 1998.			
*The lesser of the 95 % upper confidence limit (L	(UCL) & maximum concentration.	entration.			
ND = Value not deternined					

RECCH-SD2R INCIDENTAL INGESTION OF AND DERMAL CONTACT WITH SEDIMENT - RME CURRENT/FUTURE RECREATIONAL CHILD (6-16 YEARS) AOC 57 AREA 2 RECREATIONAL FORT DEVENS, MA

### CARCINOGENIC EFFECTS

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ERCENT TOTAL RISK	99.96% 0.00% 0.038%	
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TOTAL CANCER RISK	2.9E-05	3E-05
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DERMAL INTAKE ABSORPTION DERMAL EFFICIENCY (mg/kg/day)	1.5E-05 0.0E+00 0.0E+00	
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COMPOUND	SEDIMENT CONCENTRATION (MEWS)	INTAKE INGESTION (a)gog-day)	DERMAL ABSORPTION EFFICIENCY	INTAKE DERMAL (mg/kg-day)	REFERENCE DOSE ORAL DERV (mg/kg-day) (ng/kg	E DOSE DERMAL (ng/kg-day)	HAZARD QUOTIENT INGESTION	HAZARD QUOTTENT DERMAL	TÖTAL HAZARD QUOTIENT	PERCENT FOTAL RISK
Aluminum	006'51		QN		1.0E+00	ND	1.5E-03		1.5E-03	0.21%
Arsenic	220	2.1E-05	0.03	9.5E-05	3.0E-04	2.9E-04	6.9E-02	3.3E-01	4.0E-01	56.36%
Chromium	49	4.6E-06	Q.		3.0E-03	7.5E-05	1.5E-03	0.0E+00	1.5E-03	0.22%
Iron	30400	2.8E-03	QN		ON	QN				
Lead	410	3.8E-05	Ð		QN	ΩN				
Manganese	3940	3.7E-04	QX		7.1E-02	4.3E-03	5.2E-03	0.0E+00	5.2E-03	0.74%
Dieldrin	0.046	•	ΩX		5.0E-05	Q	8.6E-05		8.6E-05	0.012%
Total Petroleun Hydrocarbons	3200	3.0E-04	0.17	7.9E-03	3.0E-02	2.7E-02	1.0E-02	2.9E-01	3.0E-01	42.68%
				Sec. a season sec.	Vadistides and silver in the second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second s		*West states	<b>9.0</b> (1) (1) (1) (1) (1) (1) (1) (1) (1) (1)	4.0	
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#### RECCH-SW2R

INCIDENTAL INGESTION OF AND DERMAL CONTACT WITH SURFACE WATER - RME CURRENT/FUTURE RECREATIONAL CHILD (6-16 YEARS)
AOC 57 AREA 2 RECREATIONAL

FORT DEVENS, MA EXPOSURE PARAMETERS

20 A 10 A 10 A 10 A 10 A 10 A 10 A 10 A	IORMAS	WALUE	UNITS		
CONCENTRATION WATER	CW	average	mg/liter	CANCER RISK = INTAK	CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR (mg/kg-day) ⁻¹
INGESTION RATE	R	0.013	liters/hour		
SURFACE AREA EXPOSED	SA	2,518	cm²/day	HAZARD QUOTIENT = I	HAZARD QUOTIENT = INTAKE (mg/kg-day) / REFERENCE DOSE (mg/kg-day)
CONVERSION FACTOR	S.	0.001	liter/cm ³		
BODY WEIGHT	BW	38	kg	INTAKE = (INTAKE-ING	NTAKE = (INTAKE-INGESTION) + (INTAKE-DERMAL)
EXPOSURE TIME	Е	2	hours/day		
EXPOSURE FREQUENCY	描	52	days/year	INTAKE-INGESTION =	CW x IR x ET x EF x ED
EXPOSURE DURATION	ED	1	years		BW x AT x 365 days/yr
AVERAGING TIME					
CANCER	AT	8	years	INTAKE-DERMAL =	CW x Kpevent x ET xSA x CF x EF x ED
NONCANCER	AT	=	years		BW x AT x 365 days/yr
PERMEABILITY COEFFICIENT	Kpevent	Chemical-specific	cm/day		
Notes:					
For noncarcinogenic effects: AI = BD  ND - Value not determined					

#### RECCH-SW2R

INCIDENTAL INGESTION OF AND DERMAL CONTACT WITH SURFACE WATER - RME CURRENT/FUTURE RECREATIONAL CHILD (6-16 YEARS)
AOC 57 AREA 2 RECREATIONAL
FORT DEVENS, MA

CARCINOGENIC EFFECTS

PERCENT TOTAL RISK	%98'66		%60:0	0.0012%	0.04%	0.01%	
TOTAL CANCER RESK	5.5E-06		5.1E-09	6.7E-11	2.1E-09	5.9E-10	90-3E-06
CANCER RISK DERMAL	9.4E-07						6E-07
CANCER RISK INGESTION	4.5E-06		5.1E-09	6.7E-11	2.1E-09	5.9E-10	SE.06
PE FACTOR DERMAL (mg/kg-day)"	1.6E+00	A.Z.	A'N	A'S	¥Z	ΥZ	CERRISK
CANCER SLO ORAL (mg/kg-day)	1.5E+00	Y'A	1.4E-02	6.1E-03	5.2E-02	1.1E-02	SIMMARYCAN
INTAKE DERMAI (mg/kg-day)	5.9E-07	2.9E-06	2.3E-06	2.8E-07	2.9E-06	2.4E-06	
PERMEABLITY COEFFICIENT (cm/hody)	1.0E-03	1.0E-03	3.3E-02	1.3E-01	3.7E-01	2.3E-01	
INTAKE INGESTION (mg/kg-day)	3.0E-06	1.5E-05	3.7E-07		4.	5.4	
WATER CONCENTRATION (mg/L)	0.198	0.967	0.024	0.00072	0.0026	0.0035	
gung4kroc:	Arsenic	Lead	Bis(2-ethylbexyl)phthalate	Chloroform	Tetrachloroethylene	Trichloroethylene	

Aluninum Arcenic	CONCENTRATION (mg/L)	INGESTION (org/Rg-(lay)	COBFFICIENT (cm/hoar)	DERMAL (mg/kg-day)	ORAL DERY (mg/kg-day) (mg/kg	DERMAL (mg/kg-day)	QUOTIENT INGESTION	QUOTIENT DERMAL	HAZARD QUOTIENT	TOTAL
Arenic	15.1	1.5E-03	1.0E-03	2.9E-04	1.0E+00	AN	1.47E-03		1.5E-03	1.08%
	0.198	1.9E-05	1.0E-03	3.7E-06	3.0E-04	2.9E-04	6.43E-02	1.29E-02	7.7E-02	56.45%
Barium	0.553	5.4E-05	1.0E-03	1.0E-05	7.0E-02	4.9E-03	7.70E-04	2.13E-03	2.9E-03	2.12%
Cadnium	0.025	2.4E-06	1.0E-03	4.7E-07	5.0E-04	2.5E-05	4.87E-03	1.89E-02	2.4E-02	17.36%
Chromium	0.036	3.5E-06	1.0E-03	6.8E-07	3.0E-03	7.5E-05	1.17E-03	9.06E-03	1.0E-02	7.48%
Copper	0.375	3.7E-05	1.0E-03	7.1E-06	YZ	Y.				
Iron	17.6	1.7E-03	1.0E-03	3.3E-04	AN	A'N				
Lead	0.967	9.4E-05	1.0E-03	1.8E-05	AN	ΥZ				
Manganese	0.433	4.2E-05	1.0E-03	8.2E-06	2.4E-02	1.4E-03	1.76E-03	5.84E-03	7.6E-03	5.55%
Vanadiim	0.072	7.0E-06	1.0E-03	1.4E-06	7.0E-03	1.8E-04	1.00E-03	7.55E-03	8.6E-03	6.25%
Bis/2-ethylbexyl\nhthalate	0.024	2.3E-06	3.3E-02	1.5E-05	2.0E-02	YZ	1.17E-04		1.2E-04	%980.0
1 2-Dichloroethylenes	0.026	2.5E-06	1.0E-02	4.9E-06	9.0E-03	Ϋ́Ζ	2.82E-04		2.8E-04	0.21%
Chlomform	0.00072	7.0E-08	1.3E-01	1.8E-06	1.0E-02	4Z	7.02E-06		7.0E-06	0.0051%
Tetrachloroethylene	0.0026	2.5E-07	3.7E-01	1.8E-05	1.0E-02	Ϋ́Z	2.53E-05		2.5E-05	0.019%
Trichloroethylene	0.0035	3.4E-07	2.3E-01	1.5E-05	6.0E-03	ζ Z	5.69E-05		5.7E-05	0.042%
EPH Fractions										
C10-C22 Aromatics	1.4	1.4E-04	Ϋ́Z		3.0E-02	2.7E-02	4.55E-03		4.5E-03	3.33%
C19-C36 Aliphatics	1.7	1.7E-04	ΥZ		00E+00	5.5E+00	2.76E-05		2.8E-05	0.020%

RECCH-SS2R(CT)
INCIDENTAL INGESTION OF AND DERMAL CONTACT WITH SURFACE SOIL - CENTRAL TENDENCY
CURRENT/FUTURE RECREATIONAL CHILD (6 TO 16 YEARS)
AOC 57 AREA 2 RECREATIONAL
FORT DEVENS, MA

14-Mar-00

### EXPOSURE PARAMETERS

PARAMETER	SYMBOL	VALUE	UNITS	
CONCENTRATION SOIL	SS	See Below*	mg/kg	CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR (mg/kg-day)-1
INGESTION RATE	띮	20	mg/day	
FRACTION INGESTED	臣	%001		HAZARD QUOTIENT = INTAKE (mg/kg-day) / REFERENCE DOSE (mg/kg-day)
SOIL ADHERENCE FACTOR	SAF		mg/cm²	
SURFACE AREA EXPOSED	SA	3,850	cm²	INTAKE = (INTAKE-INGESTION) + (INTAKE-DERMAL)
CONVERSION FACTOR	ភ	1000001	kg/mg	
BODY WEIGHT	BW	38	88	$INTAKE-INGESTION = \frac{CS \times IR \times FI \times CF \times EF \times ED}{}$
EXPOSURE FREQUENCY	덈	26	days/year	BW x AT x 365 dayslyr
EXPOSURE DURATION	B	=	years	
AVERAGING TIME				INTAKE-DERMAL * CS x SA x SAF x AE x CF x EF x ED
CANCER	AT	70	years	BW x AT x 365 daysyr
NONCANCER	AT	=	years	
DERMAL ABSORPTION	AE	Chemical-specific	unitless	
EFFICIENCY				
Notes:				
For noncarcinogenic effects: AT = ED				
The dermal absorption efficiency is from the Risk Assessment Guidance for Superfund Volume I:	isk Assessment Guidance	for Superfund Volume I:		
Hurnan Health Evaluation Manual Supplemental Guidance Dermal Risk Assessment, 1998.	al Guidance Dermal Risk	Assessment, 1998.		
*The lesser of the 95 % upper confidence limit (UCL) & maximum concentration.	t (UCL) & maximum con	centration.		
ND = Value not determined				

RECCH-SSZR(CT)
INCIDENTAL INGESTION OF AND DERMAL CONTACT WITH SURFACE SOIL - CENTRAL TENDENCY
CURRENT/FUTURE RECREATIONAL CHILD (6 TO 16 YEARS)
AOC 57 AREA 2 RECREATIONAL
FORT DEVENS, MA

### CARCINOGENIC EFFECTS

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ERCENT FOTAL RISK	9.5	::::
R C K		
	3.7E-06 1.5E-06	9
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c 47.9 nese 273 r-1260 3.6 2 Aliphatics 21		1.0E-05 3.6E-06	3.05-04 ND 7.15-02 2.05-05	2.9E-04			200	RISK
7920 r-1260 3.6 2 Aliphatics 21		3.6E-06	ND 7.1E-02 2.0E-05		1.5E-02	3.6E-02	5,1E-02	14.39%
1-1260 3.6  2-Aliphatics 21  O Aronatics 17		3.6E-06	7.1E-02 2.0E-05	ΩN				
3.6 2 Aliphatics 21 0 Aronatics 17		3.6E-06	2.0E-05	QN	3.6E-04		3.6E-04	0.10%
2 Aliphatics 21				1.6E-05	1.7E-02	2.3E-01	2.4E-01	69.25%
2 Aliphatics 21 21 21 17 21 17								
0 Aronatics 17 1	0.17	2.6E-05	6.0E-01	5.5E-01	3.3E-06	4.7E-05	5.0E-05	%10.0
ЕРН	0.17	2.1E-05	3.0E-02	2.7E-02	5.3E-05	7.7E-04	8.3E-04	0.23%
C9-C18 Aliphatics 2.8E-05	0.17	3.7E-04	6.0E-01	5.5E-01	4.7E-05	6.6E-04	7.1E-04	0.20%
C19-C36 Alinhatics 3.4E-04	0.17	4.5E-03	6.0E+00	5.5E+00	5.7E-05	8.1E-04		0.25%
C11-C22 Aromatics 1,130 1.1E-04	0.17	1.4E-03	3.0E-02	2.7E-02	3.5E-03	5.1E-02	5.5E-02	15.56%



RECCH-SD2R
INCIDENTAL INGESTION OF AND DERMAL CONTACT WITH SEDIMENT - CENTRAL TENDENCY
CURRENT/FUTURE RECREATIONAL CHILD (6-16 YEARS)
AOC 57 AREA 2 RECREATIONAL
FORT DEVENS, MA

14-Mar-00

EXPOSURE PARAMETERS

PARAMETER				
CONCENTRATION SEDIMENT	ಬ	See Below*	mg/kg	CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR (mg/kg-day)-1
INGESTION RATE	ĸ	25	mg/day	
FRACTION INGESTED	E	100%		HAZARD QUOTIENT = INTAKE (mg/kg-day) / REFERENCE DOSE (mg/kg-day)
SOIL ADHERENCE FACTOR	SAF	_	mg/cm²	
SURFACE AREA EXPOSED	SA	3,850	cm³	INTAKE = (INTAKE-INGESTION) + (INTAKE-DERMAL)
CONVERSION FACTOR	ŗ	0,000001	kg/mg	
BODY WEIGHT	BW	38	kg	INTAKE-INGESTION = CS x IR x FI x CF x EF x ED
EXPOSURE FREQUENCY	H	26	days/year	BW x AT x 365 days/yr
EXPOSURE DURATION	ED	=	years	
AVERAGING TIME				INTAKE-DERMAL = CS x SA x SAF x AE x CF x EF x ED
CANCER	AT	70	years	BW x AT x 365 days/yr
NONCANCER	AT	=	years	
DERMAL ABSORPTION	AE	Chemical-specific	unitless	
EFFICIENCY				
Notes:				
For noncarcinogenic effects: AT = ED				
The dermal absorption efficiency is from the Risk Assessment Guidance for Superfund Volume I:	isk Assessment Guidance	for Superfund Volume I:		
Human Health Evaluation Manual Supplemental Guidance Dermal Risk Assessment, 1998.	al Guidance Dermal Risk	Assessment, 1998.		
*The lesser of the 95 % upper confidence limit (UCL)	(UCL) & maximum concentration.	entration.		
ND = Value not determined				

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RECCH-SD2R INCIDENTAL INGESTION OF AND DERMAL CONTACT WITH SEDIMENT - CENTRAL TENDENCY CURRENT/FUTURE RECREATIONAL CHILD (6-16 YEARS) AOC 57 AREA 2 RECREATIONAL FORT DEVENS, MA

### CARCINOGENIC EFFECTS

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PERCENT TOTAL RUSK	99.96% 0.00% 0.038%	
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CANCER SLOPE FACTOR CANCER RISK ORAL DERMAL INGESTION (DIEVEGIY)-1 (DIERE-GDY-1	9.	SE
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INTAKE Derrial mg/kg-day)	900	
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DERMAL ABSORPTION EFFICIENCY	0.03 ND ND	
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COMPOUND	SEDIMENT CONCENTRATION (me/kex	INTAKE INGESTION (mg/kg-day)	DERMAL ABSORPTION EFFICIENCY	INTAKE DERMAL (ing/kg-day)	REFERÊNCE DOSE ORAL DERM (mg/kg-day) (mg/kg	E DOSE DERMAL (mg/kg-day)	HAZARD QUOTIENT INGESTION	HAZARD QUOTIENT DERMAL	TOTAL HAZARD QUOTENT	PERCENT TOTAL RISK
Aluminum	15,900		QN		1.0E+00	QN	7.5E-04		7.5E-04	0.21%
Arsenic	220	1.0E-05	0.03	4.8E-05	3.0E-04	2.9E-04	3.4E-02	1.6E-01	2.0E-01	56.36%
Chromium	49	2.3E-06	QN		3.0E-03	7.5E-05	7.7E-04	0.0E+00	7.7E-04	0.22%
Iron	30400	1.4E-03	QN		QN	QN				
Lead	410	1.9E-05	QN		QN	QN				
Manganese	3940	1.8E-04	Q.		7.1E-02	4.3E-03	2.6E-03	0.0E+00	2.6E-03	0.74%
Dieldrin	0.046	2.2E-09	QN		5.0E-05	QN	4.3E-05		4.3E-05	0.012%
Total Petroleum Hydrocarbons	3200	1.5E-04	0.17	3.9E-03	3.0E-02	2.7E-02	5.0E-03	1.5E-01	1.5E-01	42.68%
				SUMMARY	HAZARD INDEX	*	0.04	0.3	0.4	

#### RECCH-SW2R

INCIDENTAL INGESTION OF AND DERMAL CONTACT WITH SURFACE WATER - CT CURRENT/FUTURE RECREATIONAL CHILD (6-16 YEARS)
AOC 57 AREA 2 RECREATIONAL
FORT DEVENS, MA
EXPOSURE PARAMETERS

PARAMETER	SYMBOL	VALUE	CINITS	
CONCENTRATION WATER	CW	average	mg/liter	CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR (mg/kg-day) ⁻¹
INGESTION RATE	IR	0.013	liters/hour	
SURFACE AREA EXPOSED	ΥS	2,518	cm²/day	HAZARD QUOTIENT = INTAKE (mg/kg-day) / REFERENCE DOSE (mg/kg-day)
CONVERSION FACTOR	ಕಿ	0.001	liter/cm ³	
BODY WEIGHT	BW	38	kg	INTAKE = (INTAKE-INGESTION) + (INTAKE-DERMAL)
EXPOSURE TIME	ET	2	hours/day	
EXPOSURE FREQUENCY	FB	92	days/year	$INTAKE-INGESTION = CW \times IR \times ET \times EF \times ED$
EXPOSURE DURATION	æ	=	years	BW x AT x 365 days/yr
AVERAGING TIME				
CANCER	AT	70	years	INTAKE-DERMAL - CW x Kpevent x ET xSA x CF x EF x ED
NONCANCER	AT	11	years	BW x AT x 365 daystyr
PERMEABILITY COEFFICIENT	Kpevent	Chemical-specific	cm/day	
Notes:				
For noncarcinogenic effects: AT = ED				
ND - Value not determined				
TPHC - Total Petroleum Hydrocarbons				

#### 3/14/002:04 PM

#### RECCH-SW2R

INCIDENTAL INGESTION OF AND DERMAL CONTACT WITH SURFACE WATER - CT CURRENT/FUTURE RECREATIONAL CHILD (6-16 YEARS) AOC 57 AREA 2 RECREATIONAL FORT DEVENS, MA CARCINOGENIC EFFECTS

амполую	WATER CONCENTRATION (mg/L)	INTAKE INCESTION (dig/kg-(day)	FERMEABILITY CORRECTENT (cm/linur)	INTAKE DERMAL (ng/kg-day)	REFERENCE DOSE  ORAL DERV (mg/kg-day) (mg/kg	GE DOSE DERMAL (mg/kg-day)	HAŽABD QUOTIENT INGESTION	BAZARD QUOTIENT DERMAL	TOTAL HAZAM QUOTIENT	PERCENT TOTAL RISK
Aluminum	15.1	7.4E-04	1.0E-03	1.4E-04	1.0E+00	AN	7.36E-04		7.4E-04	1.08%
Arsenic	0.198	9.7E-06	1.0E-03	1.9E-06	3.0E-04	2.9E-04	3.22E-02	6.45E-03	3.9E-02	56.45%
Barium	0.553	2.7E-05	1.0E-03	5.2E-06	7.0E-02	4.9E-03	3.85E-04	1.07E-03	1.5E-03	2.12%
Cadmium	0.025	1.2E-06	1.0E-03	2.4E-07	5.0E-04	2.5E-05	2.44E-03	9.44E-03	1.2E-02	17.36%
Chromium	0.036	1.8E-06	1.0E-03	3.4E-07	3.0E-03	7.5E-05	5.85E-04	4.53E-03	5.1E-03	7.48%
Copper	0.375	1.8E-05	1.0E-03	3.5E-06	YZ	ΥZ				
Iron	17.6	8.6E-04	1.0E-03	1.7E-04	Ϋ́Z	AN				
Lead	0.967	4.7E-05	1.0E-03	9.1E-06	Ϋ́	NA				
Manganese	0.433	2.1E-05	1.0E-03	4.1E-06	2.4E-02	1.4E-03	8.79E-04	2.92E-03	3.8E-03	2.55%
Vanadium	0.072	3.5E-06	1.0E-03	6.8E-07	7.0E-03	1.8E-04	5.01E-04	3.78E-03	4.3E-03	6.25%
Bis(2-ethylhexyl)phthalate	0.024	1.2E-06	3.3E-02	7.5E-06	2.0E-02	NA	5.85E-05		5.8E-05	%980.0
1.2-Dichloroethylenes	0.026	1.3E-06	1.0E-02	2.5E-06	9.0E-03	Y Z	1.41E-04		1.4E-04	0.21%
Chloroform	0.00072	3.5E-08	1.3E-01	8.8E-07	1.0E-02	Y.	3.51E-06		3.5E-06	0.0051%
Tetrachloroethylene	0.0026	1.3E-07	3.7E-01	9.1E-06	1.0E-02	NA	1.27E-05		1.3E-05	%610.0
Trichloroethylene	0.0035	1.7E-07	2.3E-01	7.6E-06	6.0E-03	YZ	2.84E-05		2.8E-05	0.042%
EPH Fractions										
C10-C22 Aromatics	1.4	6.8E-05	AN		3.0E-02	2.7E-02	2.27E-03		2.3E-03	3.33%
C19-C36 Aliphatics	1.7	8.3E-05	¥Z		6.0E+00	5.5E+00	1.38E-05		1.4E-05	0.020%
					SCHAMARVIHAZARDINDEX	ARD INDEX	700000000000000000000000000000000000000	::00	20.0	
				200000000000000000000000000000000000000	the latest colors to the same	Control of the second			Notice to the Carte Carte	

CON-SS2R
INCIDENTAL INGESTION OF AND DERMAL CONTACT WITH SURFACE SOIL - RME
FUTURE CONSTRUCTION WORKER
AOC 57 AREA 2 RECREATIONAL
FORT DEVENS, MA

03-Feb-00

## EXPOSURE PARAMETERS

PARAMETER	SYMBOL	VALUE	UNITS		
CONCENTRATION SOIL	SS	See Below*	mg/kg	CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR (mg/kg-day)-1	ng/kg-day)-1
INGESTION RATE	R	480	mg/day		
FRACTION INGESTED	区	%001		HAZARD QUOTIENT = INTAKE (mg/kg-day) / REFERENCE DOSE (mg/kg-day)	ig/kg-day)
SOIL ADHERENCE FACTOR	SAF	0.28	mg/cm²		-
SURFACE AREA	SA	5200	cm ²		
CONVERSION FACTOR	5	0.000001	kg/mg	INTAKE = (INTAKE-INGESTION) + (INTAKE-DERMAL)	-
BODY WEIGHT	BW	70	kg		
EXPOSURE FREQUENCY	FE3	250	days/year	INTAKE-INGESTION = $\frac{CS \times IR \times FI \times CF \times EF \times ED}{}$	
EXPOSURE DURATION	Œ	0.5	years	BW x AT x 365 days/yr	
AVERAGING TIME					
CANCER	AT	70	years	$CS \times SA \times SAE \times CE \times EF \times ED$	
NONCANCER	AT	0.5	years	BW x AT x 365 days/yr	
DERMAL ABSORPTION	AE	Chemical-specific	unitless		
EFFICIENCY					
Notes:					
For noncarcinogenic effects: AT = ED					
The dermal absorption efficiency is from the Risk Assessment Guidance for Superfund Volume I: Hurnan Health Evaluation Manual Supplemental Guidance Dermal Risk Assessment, 1998. *The lesser of the 95 % upper confidence limit (UCL) & maximum concentration.	Risk Assessment Guidance tral Guidance Dermal Risk it (UCL) & maximum conc	for Superfund Volume I: Assessment, 1998. entration.			
ND = Value not determined		i			

Rev. 8/92

CON-SSZR INCIDENTAL INGESTION OF AND DERMAL CONTACT WITH SURFACE SOIL - RME FUTURE CONSTRUCTION WORKER AOC 57 AREA 2 RECREATIONAL FORT DEVENS, MA

## CARCINOGENIC EFFECTS

PERCENT FOTAL RISK	\o		II:::::
r.F	87.73%	12.27%	
≽ . F. ∋	37.	27	
	<b> </b> ~	•	
	-		
TOTAL CANCER RISK	2.6E-06	3.7E-07	30-38
TOTAL CANCER RISK	띵	Æ	38
E 2 5	7	m,	
F 5			
	2.3E-07	1.3E-07	20-31
ANCER RESK DERMAL	3E	38.	潘
NCER RI DEKMAL	7	_	
<b>□ ≥</b>	l		
3 B			100
3			1333
	<u> </u>		
5 Z	2.4E-06	2.4E-07	90-3e
8 2	1	丑	開
NCESTION	7	7	
ž ž			
2.5	1		
CANCERSIOPE FACTOR CANCER RISK ORAL DEROGAL INCESTION (INFREGACE)	<u> </u>		
FACTOR DERMAI (mg/kg-(ay)-1	.60E+00	2.50E+00	
CANCER SLOPE FACTOR ORAL (mg/kg-day)-1	le B	Œ.	CERRISK
日本	9.	2.5	2
<b>发</b> 岛	1	- •	E
P	1		
<u>g</u>	0	0	- 8
8 7	.5E+00	2.0E+00	
8 7 8	SE	9. H	12
3 2 2	-	7	¥.
2 2 5			2
INTAKE DERMAL mg/kg-day)		~	
	1.5E-07	5.1E-08	
INTAKE DERMAL mg/kg-day)	.5E	Ξ.	
R R	-	اب	
	1		
	[		
DERMAL ABSORPTION EFFICIENCY	0.03	0.14	
- 8 G	Ö	.0	
\$ E 3	1		133
8 8 0			
E E	l		
<u>.</u>			
************	5		
# O E	1.6E-06	1.2E-07	
£ 9	.6E	.2E	Real Property
M	-	_	
3 5 5			
NFAKE GESTIC BAg-da	1		
INTAKE INGESTIC (mg/kg-da			
INTAKE INGESTIC (mg/kg-da			
INTAKE INGESTIC (mg/kg-da	-		
INTAKE IN INGESTIC (mg/kg-da	7.9	3.6	
INTAKE TON INGESTIC (mg/kg-da	47.9		
L INTAKE RATION INGESTIC	47.9		
ÜİL İNTAKE VTRATION İNGESTIC ÇVE) (mgAg-da	47.9		
SOIL CENTRATION INGESTIC (mg/kg)	47.9		
SOIL INTAKE NCENTRATION INCESTIC (mg/kg)	47.9		
SOIL INTAKE CONCENTRATION INCESTIC (mg/kg) (mg/kg-da	47.9		
SOIL: INTAKE CONCENTRATION INCESTIC (mg/kg) (mg/kg-ti	47.9		
SÓDIE INTAKE CONCENTRATION INCESTIC (INDUR) (INDUR)	47.9		
SDIL INTAKE CONCENTRATION INGESTIC (mg/kg) (mg/kg-ta	47.9		
SOUL DYNKE CONCENTRATION INGESTIGN (INPAGE) (MARA-64	47.9		
SÓLI INTAKE  CONCENTRATION INGESTIG	47.9		
ND CONCENTRATION INGESTIC (mg/kg) (mg/kg-ta	47.9		
NOUND CONCENTRATION INCESTIC (mg/kg) (mg/kg) (mg/kg-ta	47.9		
SÓIL DIYAKE MPOLIND CONCENTRATION INGESTIC (mg/kg) (mg/kg) (mg/kg)	47.9		
SDIL DYNKE COMPOUND CONCENTRATION INGESTIC (mg/kg/1	47.9	3.6	
SOMPOUND CONCENTRATION INCESTIGE (mg/kg)	47.9	3.6	
SOUL DYPAKE COMPOSIND CONCENTRATION INGESTIGN (Mg/Ag)	6.74	3.6	
SÓNE COMPOUND CONCENTRATION INGESTICE (MIGNA)	Arsenic 47.9	3.6	

47.9         2.2E-04         0.03         2.0E-05         3.0E-04         2.9E-04         7.5E-01         7.1E-02           7.920         3.7E-02         ND         0.0E+00         ND         ND         0.0E+00         7.1E-02         4.30E-03         1.8E-01         7.1E-02           1-1260         3.6         1.7E-05         0.14         7.2E-06         5.0E-05         4.0E-05         3.4E-01         1.8E-01           Adiphatics         2.1         9.9E-05         0.17         5.1E-05         5.0E-05         4.0E-05         3.4E-01         1.8E-01           Adomatics         1.7         8.0E-05         0.17         4.1E-05         3.0E-01         2.7E-04         1.5E-04           Adiphatics         2.9         1.4E-03         0.17         7.2E-04         6.0E+01         5.5E+00         2.3E-04         1.3E-04           Aliphatics         3.60         3.0E-01         3.5E+01         2.7E-04         1.5E-04         1.5E-04           Adiphatics         3.60         3.0E-01         3.5E+01         3.5E-01         1.5E-04	COMPOUND	SOUL CONCENTRATION (mg/kg)	INGESTION (mg/kg-tex)	DERMAL ABSORPTION EFFICTENCY	DERMAI. (mg/kg-day)	ORAL DERN (mg/kg-day) (mg/kg	DERMAL (tog/kg-day)	OCOTIENT INGESTION	QUOTIENT	HAZARD QUOTTENT	roTal. RISK
nese         7,920         3.7E-02         ND         0.0E+00         ND         ND         ND         0.0E+00         7.1E-02         4.30E-03         1.8E-02         0.0E+00           7-1260         3.6         1.7E-05         0.14         7.2E-06         5.0E-05         4.0E-05         3.4E-01         1.8E-01           2 Aliphatics         2.1         9.9E-05         0.17         5.1E-05         5.5E+00         1.6E-05         9.2E-06           3 Ariphatics         2.9         1.4E-03         0.17         7.2E-04         6.0E+01         2.7E-01         1.5E-04           3 Aliphatics         2.98         1.4E-03         0.17         7.2E-04         6.0E+01         5.5E+00         1.3E-04           3 Aliphatics         3.64         1.7E-03         0.17         8.8E-03         6.0E+01         5.5E+01         1.5E-04	Arsenic	47.9		0.03	2.0E-05	3.0E-04	2.9E-04	7.5E-01	7.1E-02	8.2E-01	59.23%
nese         273         1.3E-03         ND         0.0E+00         7.1E-02         4.3E-03         1.8E-02         0.0E+00           -1260         3.6         1.7E-05         0.14         7.2E-06         5.0E-05         4.0E-05         3.4E-01         1.8E-01           Adiphatics         21         9.9E-05         0.17         5.1E-05         6.0E+00         5.5E+00         1.6E-05         9.2E-06           Adiphatics         29         1.4E-03         0.17         7.2E-04         6.0E+01         2.7E-01         1.3E-04           6 Aliphatics         3640         1.7E-03         0.17         8.8E-03         6.0E+01         5.5E+00         1.3E-04           1.7E-04         1.7E-03         0.17         7.2E-04         6.0E+01         2.8E-04         1.5E-04	Iron	7,920	3.7E-02	ND		QN	QN				
2. Aiphatics 2.8 1.7E-05 0.14 7.2E-06 5.0E-05 4.0E-05 3.4E-01 1.8E-01 1.8E-01 1.8E-01 1.8E-01 1.8E-01 1.8E-01 1.8E-01 1.8E-01 1.8E-01 1.8E-01 1.8E-01 1.8E-01 1.8E-04 1.8E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05	Manganese	273	1.3E-03	ND		7.1E-02	4.30E-03	1.8E-02	0.0E+00	1.8E-02	1.30%
2 Atiphatics 2 2 9.9E-05 0.17 5.1E-05 6.0E+00 5.5E+00 1.6E-05 9.2E-06 2.2E-06 2.2E-06 2.2E-06 2.2E-06 2.2E-06 2.2E-06 2.2E-06 2.2E-04 2.2E-04 1.5E-04 1.3E-04 1.3E-04 2.2E-04 1.3E-04 2.2E-04 1.3E-04 2.2E-04 1.3E-04 1.3E-04 2.2E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04 1.3E-04	Aroclor-1260	3.6	1.7E-05	0.14		5.0E-05	4.0E-05	3.4E-01	1.8E-01	5.2E-01	37.37%
2 Aliphatics 21 9.9E-05 0.17 5.1E-05 6.0E+00 5.5E+00 1.6E-05 9.2E-06 2.0E-06 0.0E+00 5.5E+00 1.6E-05 9.2E-06 2.0E-06 0.17 8.0E-01 2.7E-04 1.5E-04 1.3E-04 1.3E-04 1.7E-02 0.17 8.0E-03 6.0E+01 5.5E+01 2.8E-04 1.6E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04 1.0E-04	VPH										
0 Aromatics         17         8.0E-05         0.17         4.1E-05         3.0E-01         2.7E-01         2.7E-04         1.5E-04           8 Aliphatics         298         1.4E-03         0.17         7.2E-04         6.0E+01         5.5E+00         2.3E-04         1.3E-04           36 Aliphatics         3640         1.7E-02         0.17         8.8E-03         6.0E+01         5.5E+01         2.8E-04         1.6E-04	C9-C12 Aliphatics	21	9.9E-05	0.17		6.0E+00	5.5E+00	1.6E-05	9.2E-06	2.6E-05	0.002%
8 Aliphatics 298 1.4E-03 0.17 7.2E-04 6.0E+00 5.5E+00 2.3E-04 1.3E-04 36 Aliphatics 36 Aliphatics 36 Aliphatics 1.7E-02 0.17 8.8E-03 6.0E+01 5.5E+01 2.8E-04 1.6E-04 1.0E-04	C9-C10 Aronatics	17	8.0E-05	0.17		3.0E-01	2.7E-01	2.7E-04	1.5E-04	4.2E-04	0.03%
298 1.4E-03 0.17 7.2E-04 6.0E+00 5.5E+00 2.3E-04 1.3E-04 1.5E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-04 1.6E-	EPH							•			
3640 1.7E-02 0.17 8.8E-03 6.0E+01 5.5E+01 2.8E-04 1.6E-04	C9-C18 Aliphatics	298	1.4E-03	0.17		6.0E+00	5.5E+00	2.3E-04	1.3E-04	3.6E-04	0.03%
100001 100001 100001 100001	C19-C36 Aliphatics	3640	1.7E-02	0.17		6.0E+01	5.5E+01	2.8E-04	1.6E-04	4.5E-04	0.03%
1,130 5.35-03 0.17 2.75-01 2.75-01 1.05-02 1.05-02	C11-C22 Aromatics	1,130	5.3E-03	0.17	2.7E-03	3.0E-01	2.7E-01	1.8E-02	1.0E-02	2.8E-02	2.01%

CON-SSZR INHALATION EXPOSURE TO PARTICULATES IN SURFACE SOIL - RME FUTURE CONSTRUCTION WORKER AOC 57 AREA 2 RECREATIONAL FORT DEVENS, MA

### EXPOSURE PARAMETERS

	mg/kg CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR (mg/kg-day)-1	ту/т²	mg/m² HAZARD QUOTIENT = INTAKE (mg/kg-day) / REFERENCE CONCENTRATION (mg/kg-day)	m ³ /kg		m ² hour INTAKE - INHALATION = <u>[CAp + Cay) x RAF x Lib x EF x EP</u>	kg BW x AT x 365 days/yr	hours/day	days/year	years AIR CONCENTRATION FARTICULATES = CS x 1/PEF		AIR CONCENTRATION VOLATILES = CS x I/VF	years (VF not calculated because there are no VOCs selected as CPCs).	years		-		
SYMBOL	S	CAp	CAv	VF Calculated	PEF	ThR .	BW	ET	EF	ED GE	RAF		AT	AT	confidence limit (UCL) & maximun	ial concern.		
PARAMETER	CONCENTRATION SOIL*	CONCENTRATION AIR PARTICULATES	CONCENTRATION AIR VOLATILES	VOLATILIZATION FACTOR**	PARTICULATE EMISSIONS FACTOR	INHALATION RATE	BODY WEIGHT	EXPOSURE TIME	EXPOSURE FREQUENCY	EXPOSURE DURATION	RELATIVE ABSORPTION FACTOR	AVERAGING TIME	CANCER	NONCANCER	Notes: * Soil concentration used is the lesser of the 95 % upper confidence limit (UCL) & maximum concentration	**Volatilization factor used only for volatile chemicals of potential concern.	For noncarcinogenic effects: AT = ED	NO - Volue not determined

CON-SS2R
INHALATION EXPOSURE TO PARTICULATES IN SURFACE SOIL - RME
FUTURE CONSTRUCTION WORKER
AOC 57 AREA 2 RECREATIONAL
FORT DEVENS, MA

#### CARCINOGENIC EFFECTS

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Arsenic         Arsenic         ND         ND         ND         ND         P9.4E-09         ND         P0.7920         NA         6.0E-06         1.5E-06         1.5E-06         1.5E-06         1.5E-06         ND         P9.97%           Aroclor-1260         Aroclor-1260         2.1E-07         5.3E-08         7.0E-10         ND         99.97%           VPH C9-C12 Aliphatics         2.1E-07         5.3E-08         4.1E-09         5.7E+00         7.2E-10         0.0000189%           C9-C12 Aliphatics         1.3E-08         3.3E-08         1.7E-01         2.0E-01         1.0E-08         0.000513%           C9-C18 Aliphatics         2.3E-06         1.1E-07         5.8E-08         5.7E+00         1.0E-08         0.000518%           C19-C36 Aliphatics         3.640         NA         8.6E-07         2.2E-07         2.2E-07         1.1E-06         0.02906%		CONCENTRATION (mg/kg)	VR (m³/kg)	(mg/m)	PARTICULATES INTAKE (mg/kg-day)	INTAIKE mg/kg-day)	(mg/kg-day)	QUOTIENT	RISK
7,920         NA         6.0E-06         1.5E-06         ND         3.8E-03           273         NA         2.1E-07         5.3E-08         1.4E-05         3.8E-03           3.6         NA         2.7E-09         7.0E-10         ND           17         NA         1.5E-08         4.1E-09         5.7E+00         7.2E-10           1         1.3E-08         3.3E-09         1.7E-01         2.0E-08           3640         NA         2.3E-07         7.1E-07         ND           1,130         NA         8.6E-07         2.2E-07         2.0E-01         1.1E-06		1	ΥN		3.6E-08	9.4E-09	QN		
273 NA 2.1E-07 5.3E-08 1.4E-05 3.8E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03 3.6E-03		7,920	YZ Y		6.0E-06	1.5E-06	QX		
3.6 NA 2.7E-09 7.0E-10 ND   1.6E-08 4.1E-09 5.7E+00 7.2E-10   1.7E-01 2.0E-08   3.3E-09 1.7E-01 2.0E-08   1.7E-01 2.0E-08   1.7E-01 2.0E-08   1.7E-01 2.0E-08   1.7E-01 2.0E-08   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06   1.1E-06		273	AN		2.1E-07	5.3E-08	1.4E-05	3.8E-03	%26.66
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1,130 NA 8.6E-07 2.2E-07 2.0E-01 1.1E-06	liphatics	3640	AZ		2.8E-06	7.1E-07	Q		
	romatics	1,130	YZ YY		8.6E-07	2.2E-07	2.0E-01	1.1E-06	0.0290%

CON-SBZR INCIDENTAL INGESTION OF AND DERMAL CONTACT WITH SUBSURFACE SOIL - RME FUTURE CONSTRUCTION WORKER AOC 57 AREA 2 RECREATIONAL FORT DEVENS, MA

14-Mar-00

EXPOSURE PARAMETERS

CONCENTRATION SOIL	ಬ	See Below*	mg/kg	CANCER RISK = INTAKE	CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR (mg/kg-day)-1
INGESTION RATE	굨	480	mg/day		
FRACTION INGESTED	Œ	%001		HAZARD QUOTIENT = E	HAZARD QUOTIENT = INTAKE (mg/kg-day) / REFERENCE DOSE (mg/kg-day)
SOIL ADHERENCE FACTOR	SAF	0.28	mg/cm²		
SURFACE AREA	SA	5200	cm²		
CONVERSION FACTOR	೪	0.000001	kg/mg	INTAKE = (INTAKE-ING)	INTAKE = (INTAKE-INGESTION) + (INTAKE-DERMAL)
BODY WEIGHT	BW	07			
EXPOSURE FREQUENCY	EF	250	days/year	INTAKE-INGESTION =	CS x IR x FI x CF x EF x ED
EXPOSURE DURATION	ED	0.5	years		BW x AT x 365 days/yr
AVERAGING TIME					
CANCER	AT	70	years	INTAKE-DERMAL =	CS x SA x SAF x AE x CF x EF x ED
NONCANCER	AT	0.5	years		BW x AT x 365 days/yr
DERMAL ABSORPTION	AE	Chemical-specific	unitless		
EFFICIENCY					
Notes:					
For noncarcinogenic effects: AT = ED					
The dermal absorption efficiency is from the Risk Assessment Guidance for Superfund Volume I:	sk Assessment Guidance	for Superfund Volume I:			
Human Health Evaluation Manual Supplemental Guidance Dermal Risk Assessment, 1998.	d Guidance Dermal Risk	Assessment, 1998.			
*The lesser of the 95 % upper confidence limit (UCL) & maximum concentration.	(UCL) & maximum con	centration.			
MD = Value not determined					

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CON-SB2R
INCIDENTAL INGESTION OF AND DERMAL CONTACT WITH SUBSURFACE SOIL - RME
FUTURE CONSTRUCTION WORKER
AOC 57 AREA 2 RECREATIONAL
FORT DEVENS, MA

## CARCINOGENIC EFFECTS

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VACE (day)	.4E-08	0E+00	0E+00	60-36	.7E-07		
NTAKE ERMAL g/kg-day)	6.4E-08	0.0E+00	0.0E+00	6.9E-09	1.7E-07		
INTAKE DERMAL (mg/kg-dax)	6.4E-08	0.0E+00	0.0E+00	6.9E-09	1.7E-07		
INTAKE DERMAL (mg/kg-day)							
INTAKE F DERMAL (mg/kg-day)							
G INTAKE ION DERMAL CY (ng/kg-day)	0.03 6.4E-08	ND 0.0E+00	ND 0.0E+00	0.14 6.9E-09	0.14 1.7E-07		
MAL INTAKE PTION DERMAL RNCY (mg/kg-day)							
ERMAL INTAKE ORFTION DERMAL SCIENCY (øgkg-day)							
DERMAL INTAKE BSOKFTION DERMAL FREIENCY (øgkg-day)							
DERMAL INTAKE ABSORFTION DERMAL EFFECIENCY (01g/kg·day)							
DERMAL INTAKE ABSORPTION DERMAL EFFECIENCY (nig/kg-day)	0.03	QN	QN	0.14	0.14		
DERMÁE INTAKE ABSOKPTIÓN DERMAL EFFYCIENCY (ABGAg-day)	0.03	QN	QN	0.14	0.14		
E DERMAL INTAKE ON ABSORPTION DERMAL OS EPPKCIENCY (ongle-day)	0.03	QN	QN	0.14	0.14		
AKC: DERMAL INFAKE STRON ABSORPTION DERMAL 5-49.) EPPKLENCY (AUGRE-48.)	0.03		QN	0.14			
NTAKE DERMAL INTAKE CESTION ABSORPTION DERMAL PREADY EPFICIENCY (AUGREGAS)	0.03	QN	QN	0.14	0.14		
INTAKO DERMAL INTAKE INCESTRON ABSORPTION DERMAL (IND/Re-day) EPPKCIENCY (ong/re-day)	0.03	QN	QN	0.14	0.14		
INTAKE DERMAL INTAKE INGESTRON ABSORPTION DERMAL (mg/kg-day) EPTKCIRNCY kag/kg-day)	0.03	QN	QN	0.14	0.14		
INTAKE DERMÁL INTAKE INCESTRON ABSORPTION DERMAL (mg/kg-day) EPYKCIENCY kagkg-day)	0.03	1.7E-04 ND	3.8E-10 ND	1.6E-08 0.14	4.0E-07 0.14		
INTAKE DERMAL INTAKE  N INCESTION ABSORPTION DERMAL  (IMPRE-Day) EPPICIENCY (Applies as y)	0.03	1.7E-04 ND	3.8E-10 ND	1.6E-08 0.14	0.14		
INTAKE BERMAL INTAKE  FLON INCESTRON ABSORPTION DERMAL  (INDVE-Day) EPPKCIENCY (AUG/E-day)	0.03	QN	3.8E-10 ND	0.14	4.0E-07 0.14		
LATION INCESTION ABSORPTION DERMAL  D) (mg/kg-dd.) EVFYCIENCY (mg/kg-da.)	0.03	1.7E-04 ND	QN	1.6E-08 0.14	4.0E-07 0.14		
OG. INTAKE DERMAL INTAKE ************************************	0.03	1.7E-04 ND	3.8E-10 ND	1.6E-08 0.14	4.0E-07 0.14		
SOM, INTAKE DERMAL INTAKE ENTRATION INCESTRON ABSORPTION DERMAL (MEMA) EPPRCIENCY KMYKE-day)	0.03	1.7E-04 ND	3.8E-10 ND	1.6E-08 0.14	4.0E-07 0.14		
SOU INTAKE DERMAL INTAKE NCENTRATION ABSORPTION DERMAL (mg/kg-day) EPYKLENCY Kag/kg-day)	0.03	1.7E-04 ND	3.8E-10 ND	1.6E-08 0.14	4.0E-07 0.14		
SOU. INTAKE DERMAL INTAKE CONCENTRATION INCESTION ABSORPTION DERMAL (408/48) (INPRE-03) EPFICIENCY (408/48-43-3)	0.03	1.7E-04 ND	3.8E-10 ND	1.6E-08 0.14	4.0E-07 0.14		
SOM, INTAKE DERMAL INTAKE CONCENTRATION INCESTRON ABSORPTION DERMAL (digAg) [INDV&=day]	0.03	1.7E-04 ND	3.8E-10 ND	1.6E-08 0.14	4.0E-07 0.14		
SOU. INTAKE DERMAL INTAKE CONCENTRATION INCESTION ABSORPTION DERMAL (mg/kg-dby) EPT/CIBNC'Y (mg/kg-dby)	0.03	1.7E-04 ND	3.8E-10 ND	1.6E-08 0.14	4.0E-07 0.14		
SOU. INTAKE DERMAL INTAKE CONCENTRATION INGESTRON ABSORPTION DERMAL (mg/kg/) (mg/kg/ssy) EPPKCIRNCY kmg/kg-ssy)	0.03	1.7E-04 ND	3.8E-10 ND	1.6E-08 0.14	4.0E-07 0.14		
SOB. INTAKE DERMAL INTAKE CONCENTRATION INCESTRON ABSORPTION DERMAL (sigkg) (mg/kg-day) EPYKCIENCY kag/kg-day)	0.03	1.7E-04 ND	3.8E-10 ND	1.6E-08 0.14	4.0E-07 0.14		
SOB. INTAKE DERMAL INTAKE CONCENTRATION INCESTION ABSORPTION DERMAL (mg/kg-day) EPPKLENCY Kng/kg-day)	0.03	1.7E-04 ND	3.8E-10 ND	1.6E-08 0.14	4.0E-07 0.14		
ND CONCENTRATION INCESTRON ABSORPTION DERMAL (ng/kg-day)	0.03	1.7E-04 ND	3.8E-10 ND	1.6E-08 0.14	4.0E-07 0.14		
SOR INTAKE DERMAL INTAKE  JUND CONCENTRATION INCESTION ABSORPTION DERMAL  (mg/kg-dby) EPTXCIENCY (mg/kg-dby)	0.03	1.7E-04 ND	3.8E-10 ND	1.6E-08 0.14	4.0E-07 0.14		
SOM, INTAKE DERMAL INTAKE TPOUND CONCENTRATION INGESTRON ABSORPTION DERMAL (mg/kg-13+) EPFKCIRNCY Kmg/kg-13+)	0.03	1.7E-04 ND	3.8E-10 ND	1.6E-08 0.14	4.0E-07 0.14		
OMPOUND CONCENTRATION INCESTRON ABSORPTION DERMAL  (MEYR-1919) EPFKCIENCY (MEYR-1919)	0.03	1.7E-04 ND	3.8E-10 ND	0.482 1.6E-08 0.14	12 4.0E-07 0.14		
SOR INTAKE DERMAL INTAKE COMPOUND CONCENTRATION INCESTION ABSORPTION DERMAL (IND/R-day) EPPKLENCY SAIGR-day)	0.03	1.7E-04 ND	3.8E-10 ND	0.482 1.6E-08 0.14	12 4.0E-07 0.14		
SOB: INTAKE DERMAL INTAKE COMPOUND CONCENTRATION INCESTION ABSORPTION DERMAL (mp/le-day) EPPKLENCY (apple-day)	21 7.05-07 0.03	1.7E-04 ND	0.0113 3.8E-10 ND	0.482 1.6E-08 0.14	12 4.0E-07 0.14		
SOR: INTAKE DERMAL INTAKE INTAKE COMPOUND CONCENTRATION INCESTRON ABSORPTION DERMAL (sigkg) (mg/kg-day) EPRYCIENCY (sigkg-day)	21 7.05-07 0.03	S060 1.7E-04 ND	0.0113 3.8E-10 ND	0.482 1.6E-08 0.14	12 4.0E-07 0.14		
SOG. INTAKE DERMAL INTAKE COMPOUND CONCENTRATION INCESTION ABSORPTION DERMAL (000kg) (1000kg-day) EPTICIENCY (4000kg-day)	0.03	1.7E-04 ND	3.8E-10 ND	1.6E-08 0.14	4.0E-07 0.14		

COMPOUND	CONCENTRATION	NGESTION	ABSORPTION	DERMAL	ORAL	DERMAL	QUOTIENT	QUOTIENT	HAZARD	TOTAL
Aluminum	0269	3.3E-02	ND	0.0E+00	1.0E+00	ON ND	3.3E-02	DERMAC	3.3E-02	RISK
Arsenic	21	9.9E-05	0.03	9.0E-06	3.0E-04	2.9E-04	3.3E-01	3.15-02	3.6E-01	12.21%
Chromium	2410	1.1E-02	QX	0.0E+00	2.0E-02	5.0E-04	5.7E-01	0.0E+00	5.7E-01	19.21%
Iron	0889	3.2E-02	QN	0.0E+00	QN	QN				
Lead	9090	2.46-02	QN	0.0E+00	QX	N				
Manganese	169	7.9E-04	CZ.	0.0E+00	7.1E-02	4.3E-03	1.1E-02	0.0E+00	1.1E-02	0.38%
Dieldrin	0.0113	5.3E-08	CZ.	0.0E+00	5.0E-05	Q	1.1E-03		1.1E-03	0.04%
Aroclor-1248	0.482	2.3E-06	0.14	9.6E-07	5.0E-05	4.0E-05	4.5E-02	2.4E-02	6.9E-02	2.35%
Aroclor-1260	12	5.6E-05	0.14	2.4E-05	5.0E-05	4.0E-05	1.1E+00	6.0E-01	1.7E+00	28.56%
УРН						····				
C9-C12 Aliphatics	130	6.1E-04	0.17	3.1E-04	6.0E+00	5.5E+00	1.0E-04	5.7E-05	1.6E-04	0.005%
C9-C10 Aromatics	93	4.4E-04	0.17	2.3E-04	3.0E-01	2.7E-01	1.5E-03	8.3E-04	2.3E-03	0.08%
ЕРН										
C9-C18 Aliphatics	1860	8.7E-03	0.17	4.5E-03	6.0E+00	5.5E+00	1.5E-03	8.2E-04	2.3E-03	%80.0
C19-C36 Aliphatics	22,700	1.1E-01	0.17	5.5E-02	6.0E+01	5.5E+01	1.8E-03	1.0E-03	2.8E-03	0.09%
C11-C22 Aromatics	7050	3.3E-02	0.17	1.7E-02	3.0E-01	2.7E-01	1.1E-01	6.3E-02	1.7E-01	2.89%

CON-SBZK
INHALATION EXPOSURE TO PARTICULATES IN SUBSURFACE SOIL - RME
FUTURE CONSTRUCTION WORKER
AOC 57 AREA 2 RECREATIONAL
FORT DEVENS, MA

14-Mar-00

## EXPOSURE PARAMETERS

PARAMETER	SYMBOL	VALUE UNITS	UNITES	CANFER RISK = INTAKE (molko-day) x CANCER SLOPE FACTOR (molke-day)-1
CONCENTRATION SOIL*	3	See Delow	mg/kg	CAINCEN MISN — 11.1 AND (11.8/18/11.1) A CAINCEN SECT D FOR 11.1 AND 11.1
CONCENTRATION AIR PARTICULATES	CAp	Calculated	mg/m³	
CONCENTRATION AIR VOLATILES	CAv	Calculated	mg/m³	HAZARD QUOTIENT = INTAKE (mg/kg-day) / REFERENCE CONCENTRATION (mg/kg-day)
VOLATILIZATION FACTOR**	VF	Calculated	m³/kg	
PARTICULATE EMISSIONS FACTOR	PEP	1.32E+09	ug/m³	
INHALATION RATE	IhR	3.3	m³/hour	INTAKE - INHALATION = $(CAp + Cav) \times RAF \times IRR \times ET \times EF \times ED$
BODY WEIGHT	BW	70	kg	BW x AT x 365 days/yr
EXPOSURE TIME	E	00	hours/day	
EXPOSURE FREQUENCY	EF	250	days/year	
EXPOSURE DURATION	<u>a</u>	0.5	years	AIR CONCENTRATION PARTICULATES = CS x 1/PEF
RELATIVE ABSORPTION FACTOR	RAF	%001		
AVERAGING TIME				AIR CONCENTRATION VOLATILES = CS x I/VF
CANCER	AT	2	years	(VF not calculated because there are no VOCs selected as CPCs).
NONCANCER	AT	0.50	years	
Notes: * Soil concentration used is the lesser of the 95 % upper confidence limit (UCL) & maximum concentration	er confidence limit (UCL) & m	aximum concentration		
**Volatilization factor used only for volatile chemicals of potential concern.	ntial concern.			
For noncarcinogenic effects: AT = ED				
ND = Value not determined				

CON-SB2R
INHALATION EXPOSURE TO PARTICULATES IN SUBSURFACE SOIL - RME
FUTURE CONSTRUCTION WORKER
AOC 57 AREA 2 RECREATIONAL
FORT DEVENS, MA

#### CARCINOGENIC EFFECTS

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NOO	ic	nium			or- 1248	or-1260	
NOO	Arsenic	Tomium	Lead	ldrin	Aroclor- 1248	Aroclor-1260	

	(gy/gu)	333 (m//kg) (333)	((((((((((((((((((((((((((((((((((((((	Company (Company)	(Captaly)	COCATENT.	MON.
Aluminum	0/.69	Υ Z	3.35-00	1.45-00	1.05-03	1.45-05	0.87%
Arsenic	21	Y.	1.6E-08	4.1E-09	QN		
Chromium	2410	AN	1.8E-06	4.7E-07	2.9E-05	1.6E-02	81.33%
Iron	0889	AN	5.2E-06	1.3E-06	QN		
Lead	9095	Ϋ́	3.8E-06	9.9E-07	ΩN		
Manganese	691	¥Z	1.3E-07	3.3E-08	1.4E-05	2.4E-03	11.81%
Dieldrin	0,0113	NA	8.6E-12	2.2E-12	QX		
Aroclor-1248	0.482	NA	3.7E-10	9.4E-11	QN		
Aroclor-1260	12	NA	9.1E-09	2.3E-09	Q.		
<u>rph</u>		NA					
C9-C12 Aliphatics	130	AN	9.8E-08	2.5E-08	5.7E+00	4.5E-09	0.000022%
C9-C10 Aromatics	93	AN	7.0E-08	1.8E-08	1.7E-01	1.1E-07	0.00054%
EPH		NA					
C9-C18 Aliphatics	1860	NA	1.4E-06	3.6E-07	5.7E+00	6.4E-08	0.00032%
C19-C36 Aliphatics	22,700	AN	1.7E-05	4.4E-06	QX		
C11-C22 Aromatics	7050	AN	5.3E-06	1.4E-06	2.0E-01	6.9E-06	0.034%

CON-SS2R(CT)
INCIDENTAL INGESTION OF AND DERMAL CONTACT WITH SURFACE SOIL - CENTRAL TENDENCY
FUTURE CONSTRUCTION WORKER
AOC 57 AREA 2 RECREATIONAL
FORT DEVENS, MA

03-Feb-00

## EXPOSURE PARAMETERS

PARAMETER	SYMBOL	VALUE	SLIVI		
IIOS NOLLA GENERALIZA	S	See Below*	me/ke	CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR (mg/kg-day)-1	ER SLOPE FACTOR (mg/kg-day)-1
	3 !		2		
INGESTION RATE	N N	480	mg/day		
FRACTION INGESTED	E	100%		HAZARD QUOTIENT = INTAKE (mg/kg-day) / REFERENCE DOSE (mg/kg-day)	REFERENCE DOSE (mg/kg-day)
SOIL ADHERENCE FACTOR	SAF	0.28	mg/cm²		
SURFACE AREA	SA	5200	eu"		
CONVERSION FACTOR	ر د	0.000001	kg/mg	INTAKE = (INTAKE-INGESTION) + (INTAKE-DERMAL)	DERMAL)
BODY WEIGHT	BW	70	kg		
EXPOSURE FREQUENCY	EF	250	days/year	$INTAKE-INGESTION = \frac{CS \times IR \times FI \times CF \times EF \times ED}{CS \times IR \times FI \times CF \times EF \times ED}$	CF x EF x ED
EXPOSURE DURATION	ED	0.25	years	BW x AT x 365 days/yr	65 days/yr
AVERAGING TIME					
CANCER	AT	70	years	INTAKE-DERMAL = CS x SA x SAF x AE x CF x EF x ED	Ex CF x EF x ED
NONCANCER	AT	0.25	years	BW x AT x 365 days/yr	65 days/yr
DERMAL ABSORPTION	AE	Chemical-specific	unitless		
EFFICIENCY					
Notes:					
For noncarcinogenic effects: AT = ED					
The dermal absorption efficiency is from the Risk	isk Assessment Guidance	Assessment Guidance for Superfund Volume I:			
Human Health Evaluation Manual Supplemental Guidance Dermal Risk Assessment, 1998.	al Guidance Dermal Risk	Assessment, 1998.			
*The lesser of the 95 % upper confidence limit (UCL) & maximum concentration.	(UCL) & maximum con	centration.			
ND = Value not determined					

Rev. 8/92

CON-SSZR(CT)
INCIDENTAL INGESTION OF AND DERMAL CONTACT WITH SURFACE SOIL - CENTRAL TENDENCY
FUTURE CONSTRUCTION WORKER
AOC 57 AREA 2 RECREATIONAL
FORT DEVENS, MA

### CARCINOGENIC EFFECTS

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COMPOUND CON	Time	INTAKE	DERMAL	DIAKE	REFERENCE DOSE	E DOST	HAZARD	HAZARO	TOTAL	PERCENT
	CONCENTRATION (mg/kg)	INGESTION (mg/kg-day)	ABSORPTION Efflicency	DERMAL (mg/kg-day)	ORAL (mg/kg-day)	DERMAL (mg/kg-d23)	QUOTIENT INGESTION	QUOTIENT DERMAL	HAZARD QUÓTTENT	TOTAL
Arsenic	47.9	2.2E-04	0.03	2.0E-05	3.0E-04	2.9E-04	7.5E-01	7.1E-02	8.2E-01	59.23%
Iron	7,920	3.7E-02	QN		QN	QN				
Manganese	273	1.3E-03	Q	-	7.1E-02	4.30E-03	1.8E-02	0.0E+00	1.8E-02	1.30%
Aroclor-1260	3.6	1.7E-05	0.14	7.2E-06	5.0E-05	4.0E-05	3.4E-01	1.8E-01	5.2E-01	37.37%
VPH										
C9-C12 Aliphatics	21	9.9E-05	0.17	5.1E-05	6.0E+00	5.5E+00	1.6E-05	9.2E-06	2.6E-05	0.002%
C9-C10 Aromatics	17	8.0E-05	0.17	4.1E-05	3.0E-01	2.7E-01	2.7E-04	1.5E-04	4.2E-04	0.03%
ЕРН	.,		-							
C9-C18 Aliphatics	298	1.4E-03	0.17	7.2E-04	6.0E+00	5.5E+00	2.3E-04	1.3E-04	3.6E-04	0.03%
C19-C36 Aliphatics	3640	1.7E-02	0.17	8.8E-03	6.0E+01	5.5E+01	2.8E-04	1.6E-04	4.5E-04	0.03%
C11-C22 Aronatics	1,130	5.3E-03	0.17	2.7E-03	3.0E-01	2.7E-01	1.8E-02	1.0E-02	2.8E-02	2.01%

CON-SZZK(CT)
INHALATION EXPOSURE TO PARTICULATES IN SURFACE SOIL - CENTRAL TENDENCY
FUTURE CONSTRUCTION WORKER
AOC 57 AREA 2 RECREATIONAL
FORT DEVENS, MA

### EXPOSURE PARAMETERS

PARAMETER	SYMBOL	VALUE	UNITS	
CONCENTRATION SOIL*	CS	See below	mg/kg	CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR (mg/kg-day)-1
CONCENTRATION AIR PARTICULATES	CAp	Calculated	mg/m³	
CONCENTRATION AIR VOLATILES	CAv	Calculated	mg/m³	HAZARD QUOTIENT = INTAKE (mg/kg-day) / REFERENCE CONCENTRATION (mg/kg-day)
VOLATILIZATION FACTOR**	VF	Calculated	m³/kg	
PARTICULATE EMISSIONS FACTOR	PEF	1.32E+09	ng/m³	
INHALATION RATE	IhR	3.3	m²/hour	INTAKE - INHALATION = $\frac{(C_{AD} + C_{BV}) \times RAF \times InR \times ET \times EF \times ED}{C_{AD} + C_{BV} \times RAF \times InR \times ET \times EF \times ED}$
BODY WEIGHT	BW	70	ķg	BW x AT x 365 days/yr
EXPOSURE TIME	ЕТ	<b>00</b>	hours/day	
EXPOSURE FREQUENCY	EF	250	days/year	
EXPOSURE DURATION	Œ	0.25	years	AIR CONCENTRATION PARTICULATES = CS x 1/PEF
RELATIVE ABSORPTION FACTOR	RAF	100%		
AVERAGING TIME		-		AIR CONCENTRATION VOLATILES = CS x 1/VF
CANCER	AT	07	years	(VF not calculated because there are no VOCs selected as CPCs).
NONCANCER	AT	0.25	years	
Notes: * Soil concentration used is the lesser of the 95 % upper confidence limit (UCL.)	r confidence limit (UCL) & m	& maximum concentration	u	
**Volatilization factor used only for volatile chemicals of potential concern.	tial concern.			
For noncarcinogenic effects: AT = ED				
ND = Value not determined				

CON-SSZR(CT)
INHALATION EXPOSURE TO PARTICULATES IN SURFACE SOIL - CENTRAL TENDENCY
FUTURE CONSTRUCTION WORKER
AOC 57 AREA 2 RECREATIONAL
FORT DEVENS, MA

#### CARCINOGENIC EFFECTS

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PERCENT TOTAL RISK			%26.66			0.00002%	0.0005%		0.0003%		0.03%	
HAZARD QUOTIENT			3.8E-03			7.2E-10	2.0E-08		1.0E-08		1.1E-06	0.904
REFERENCE DOSE (mg/kg-day)	QN	2	1.4E-05	S		5.7E+00	1.7E-01		5.7E+00	2	2.0E-01	KRD INDEX
RI (mg/kg-tlay) (t	9.4E-09	1.5E-06	5.3E-08	7.0E-10		4.1E-09	3.3E-09		5.8E-08	7.1E-07	2.2E-07	SUMMARY HAZ
ILATES m²)	3.6E-08	6.0E-06	2.1E-07	2.7E-09		1.6E-08	1.3E-08		2.3E-07	2.8E-06	8.6E-07	- 50
CENT												
ARCOP VOLATILES (mg/ar)	V	<u> </u>	4	₹		₹	<u> </u>		₹	¥		
V.F. (m*/kg)	NA	NA		NA			NA.				Y.	
SOIL CONCENTRATION (mg/kg)	47.9	7,920	273	3.6		21	17		298	3640	1,130	
									<del></del>			
СОМРОЕМО										Ş	ss	
	Arsenic	Iron	Manganese	Aroclor-1260	VPH	C9-C12 Aliphatics	C9-C10 Aromatics	EPH	C9-C18 Aliphatics	C19-C36 Aliphatics	C11-C22 Aromatics	

CON-SB2R(CT)
INCIDENTAL INGESTION OF AND DERMAL CONTACT WITH SUBSURFACE SOIL - CENTRAL TENDENCY
FUTURE CONSTRUCTION WORKER
AOC 57 AREA 2 RECREATIONAL
FORT DEVENS, MA

14-Mar-00

### EXPOSURE PARAMETERS

PARAMETER	SYMBOL	VALUE	UNITS		
CONCENTRATION SOIL	CS	See Below*	mg/kg	CANCER RISK = INTAKE	CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR (mg/kg-day)-1
INGESTION RATE	æ	480	mg/day		•
FRACTION INGESTED	E	%001		HAZARD QUOTIENT = IN	HAZARD QUOTIENT = INTAKE (mg/kg-day) / REFERENCE DOSE (mg/kg-day)
SOIL ADHERENCE FACTOR	SAF	0.28	mg/cm²	-	
SURFACE AREA	ΥS	\$200	cm ₃		
CONVERSION FACTOR	៦	0.000001	kg/mg	INTAKE = (INTAKE-ING)	INTAKE = (INTAKE-INGESTION) + (INTAKE-DERMAL)
BODY WEIGHT	BW	70	kg		
EXPOSURE FREQUENCY	EF	250	days/year	INTAKE-INGESTION =	CS x IR x FI x CF x EF x ED
EXPOSURE DURATION	G	0.25	years		BW x AT x 365 days/yr
AVERAGING TIME					
CANCER	AT	70	years	INTAKE-DERMAL ==	CS x SA x SAF x AE x CF x EF x ED
NONCANCER	AT	0.25	years		BW x AT x 365 days/yr
DERMAL ABSORPTION	AE	Chemical-specific	unitless		
EFFICIENCY					
Notes:					
For noncarcinogenic effects: AT = ED					
The dermal absorption efficiency is from the Risk	isk Assessment Guidance	Assessment Guidance for Superfund Volume I:			
Human Health Evaluation Manual Supplemental Guidance Dermal Risk Assessment, 1998.	al Guidance Dermal Risk	Assessment, 1998.			
*The lesser of the 95 % upper confidence limit (UCL) & maximum concentration.	t (UCL) & maximum conc	entration.		÷	
ND = Value not determined					

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CON-SB2R(CT)
INCIDENTAL INGESTION OF AND DERMAL CONTACT WITH SUBSURFACE SOIL - CENTRAL TENDENCY
FUTURE CONSTRUCTION WORKER
AOC 57 AREA 2 RECREATIONAL
FORT DEVENS, MA

## CARCINOGENIC EFFECTS

21 3.5E-07 0.03 3.2E-08 1.5E+00 1.60E+00 5.3E-07 5.1E-08 5.8E-07 47.37% 5.0E+00 0.0113 1.9E-10 ND 0.0E+00 1.6E+01 ND 3.0E-09 8.6E-09 2.5E-08 2.0E+00 2.50E+00 1.6E-08 8.6E-09 2.5E-08 2.02% 2.0E+00 2.50E+00 2.50E+00 4.0E-07 5.1E-07 6.2E-07 50.36%
8.5E-05 ND 0.0E+00 ND ND 3.0E-09 3.0E-09 1.9E-10 ND 0.0E+01 ND 0.0E+00 1.6E+01 ND 3.0E-09 2.5E+00 1.6E-08 8.6E-09 2.5E-08 2.0E+00 2.50E+00 4.0E-07 2.1E-07 6.2E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0E-07 5.0
1.9E-10     ND     0.0E+00     1.6E+01     ND     3.0E-09     3.0E-09       8.1E-09     0.14     3.4E-09     2.0E+00     2.50E+00     1.6E-08     8.6E-09     2.5E-08       2.0E-07     0.14     8.5E-08     2.0E+00     2.50E+00     4.0E-07     2.1E-07     6.2E-07     5
8.1E-09 0.14 3.4E-09 2.0E+00 2.50E+00 1.6E-08 8.6E-09 2.5E-08 2.0E-07 0.14 8.5E-08 2.0E+00 2.50E+00 4.0E-07 2.1E-07 6.2E-07 5
2.0E-07 0.14 8.5E-08 2.0E+00 2.50E+00 4.0E-07 6.2E-07 5

COMPOUND	SOIL CONCENTRATION (mg/kg)	INTAKE INGESTION (ng/kg-day)	DERMAL ABSORPTION EFFICIENCY	DERMAL (mg/kg-day)	REFERENCE DOSE ORAL DERM (mg/kg-(4ay) (mg/kg-	E DOSE DERMAL (mg/kg-day)	HAZARD QUOTIENT INGESTION	BAZARD QUOTIENT DERMAL	TOTAL HAZARD QUOTIENT	PERCENT TOTAL RISK
Aluminum	0269	3.3E-02	Q	0.0E+00	QN	QN				
Arsenic	21	9.9E-05	0.03	9.0E-06	3.0E-04	2.9E-04	3.3E-01	3.1E-02	3.6E-01	12.34%
Chromium	2410	1.1E-02	QN	0.0E+00	2.0E-02	5.0E-04	5.7E-01	0.0E+00	5.7E-01	19.45%
Iron	0889	3.2E-02	QN	0.0E+00	QN	QN				
Lead	2060	2.4E-02	Q	0.0E+00	QN	QN				
Manganese	169	7.9E-04	QN	0.0E+00	7.1E-02	4.30E-03	1.1E-02	0.0E+00	1.1E-02	0.38%
Dieldrin	0.0113	5.3E-08	QN	0.0E+00	5.0E-05	QN	1.1E-03		1.1E-03	0.04%
Aroclor-1248	0.482	2.3E-06	0.14	9.6E-07	5.0E-05	4.0E-05	4.5E-02	2.4E-02	6.9E-02	2.38%
Aroclor-1260	12	5.6E-05	0.14	2.4E-05	5.0E-05	4.0E-05	1.1E+00	6.0E-01	1.7E+00	59.22%
HAA										
C9-C12 Aliphatics	130	6.1E-04	0.17	3.1E-04	6.0E+00	5.5E+00	1.0E-04	5.7E-05	1.6E-04	0.005%
C9-C10 Aromatics	93	4.4E-04	0.17	2.3E-04	3.0E-01	2.7E-01	1.5E-03	8.3E-04	2.3E-03	%80.0
EPH										
C9-C18 Aliphatics	1860	8.7E-03	0.17	4.5E-03	6.0E+00	5.5E+00	1.5E-03	8.2E-04	2.3E-03	0.08%
C19-C36 Aliphatics	22,700	1.1E-01	0.17	5.5E-02	6.0E+01	5.5E+01	1.8E-03	1.0E-03	2.8E-03	0.10%
C11-C22 Aromatics	7050	3.3E-02	0.17	1.7E-02	3.0E-01	2.7E-01	1.1E-01	6.3E-02	1.7E-01	2.96%
				SUMMARY	SUMMARY HAZARD INDEX	X	7::::::::::::::::::::::::::::::::::::::	E0	C	

CON-SBAC(CT)
INHALATION EXPOSURE TO PARTICULATES IN SUBSURFACE SOIL - CENTRAL TENDENCY
FUTURE CONSTRUCTION WORKER
AOC 57 AREA 2 RECREATIONAL
FORT DEVENS, MA

14-Mar-00

## EXPOSURE PARAMETERS

				For noncarcinogenic effects: AT = ED
			tial concern.	**Volatilization factor used only for volatile chemicals of potential concern.
	_	maximum concentration	r confidence limit (UCL) &	Notes: * Soil concentration used is the lesser of the 95 % upper confidence limit (UCL) & maximum concentration
	years	0.25	AT	NONCANCER
(VF not calculated because there are no VOCs selected as CPCs).	years	70	AT	CANCER
AIR CONCENTRATION VOLATILES = CS x 1/VF				AVERAGING TIME
		%001	RAF	RELATIVE ABSORPTION FACTOR
AIR CONCENTRATION PARTICULATES = CS x 1/PEF	years	0.25	æ	EXPOSURE DURATION
	days/year	250	田	EXPOSURE FREQUENCY
	hours/day	<b>∞</b>	뮵	EXPOSURE TIME
BW x AT x 365 days/yr	κ B	02	BW	BODY WEIGHT
INTAKE - INHALATION = $(CAp + Cav) \times RAF \times IhR \times ET \times EF \times ED$	m³/hour	3.3	IhR	INHALATION RATE
	ug/m³	1.32E+09	PEF	PARTICULATE EMISSIONS FACTOR
	m³/kg	Calculated	VF	VOLATILIZATION FACTOR**
HAZARD QUOTIENT = INTAKE (mg/kg-day) / REFERENCE CONCENTRATION (mg/kg-day)	mg/m³	Calculated	CAv	CONCENTRATION AIR VOLATILES
	mg/m³	Calculated	САр	CONCENTRATION AIR PARTICULATES
CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR (mg/kg-day)-1	mg/kg	See below	S	CONCENTRATION SOIL*
	UNITS	VALUE	SYMBOL	PARAMETER



CON-SB2R(CT)
INHALATION EXPOSURE TO PARTICULATES IN SUBSURFACE SOIL - CENTRAL TENDENCY
FUTURE CONSTRUCTION WORKER
AOC 57 AREA 2 RECREATIONAL
FORT DEVENS, MA

#### CARCINOGENIC EFFECTS

-	0.32%	%99.66		.00018%	2.00097%	%		
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	(Sy/Su)	(E, 20)	('m/s/m')	(mg/kg-day)	(mg/kg-day)	QUOTIENT	RUSK
Aluminum	0269	NA	5.3E-06	1.4E-06	1.0E-03	1.4E-03	7.32%
Arsenic	21	Ϋ́Z	1.6E-08	4.1E-09	QN		_
Chromium	2410	NA	1.8E-06	4.7E-07	2.9E-05	1.6E-02	87.28%
lron	0889	AN	5.2E-06	1.3E-06	QN		_
Lead	2060	AN	3.8E-06	9.9E-07	QN		
Manganese	691	Y Z	1.3E-07	3.3E-08	1.4E-05	2.4E-03	12.68%
Dieldrin	0.0113	¥Z	8.6E-12	2.2E-12	QN		
Aroclor-1248	0.482	Y Z	3.76-10	9.4E-11	QN		
Aroclor-1260	12	Ϋ́	9.1E-09	2.3E-09	QN		
VPH		Y X					
C9-C12 Aliphatics	130	NA	9.8E-08	2.5E-08	5.7E+00	4.5E-09	0.000024%
C9-C10 Aromatics	93	Υ _Z	7.0E-08	1.8E-08	1.7E-01	1.1E-07	0.00057%
ЕРН	•	Ϋ́					
C9-C18 Aliphatics	1860	AN A	1.4E-06	3.6E-07	5.7E+00	6.4E-08	0.00034%
C19-C36 Aliphatics	22,700	NA	1.7E-05	4.4E-06	QV		
C11-C22 Aromatics	7050	NA N	5.3E-06	1.4E-06	2.0E-01	6.9E-06	0.037%

RES-SSTR
INCIDENTAL INGESTION OF AND DERMAL CONTACT WITH SURFACE SOIL - RME
UNRESTRICTED LAND USE - ADULT RESIDENT
AOC 57 AREA 2 RECREATIONAL
FORT DEVENS, MA

14-Mar-00

### EXPOSURE PARAMETERS

CONCENTRATION SOIL	S	See Below*	mg/kg	CANCER RISK = INTAKE (mg/kg-dny) x CANCER SLOPE FACTOR (mg/kg-day)-1
INGESTION RATE	ĸ	001	mg/day	
FRACTION INGESTED	E	100%		HAZARD QUOTIENT = INTAKE (mg/kg-day) / REFERENCE DOSE (mg/kg-day)
SOIL ADHERENCE FACTOR	SAF	80:0	mg/cm²	
SURFACE AREA EXPOSED	SA	5,800	cm²	INTAKE = (INTAKE-INGESTION) + (INTAKE-DERMAL)
CONVERSION FACTOR	CF.	0.000001	kg/mg	
BODY WEIGHT	BW	02	kg	INTAKE-INGESTION = $\frac{CS \times IR \times FI \times CF \times EF \times ED}{}$
EXPOSURE FREQUENCY	超	150	days/year	BW x AT x 365 days/yr
EXPOSURE DURATION	GB	24	years	
AVERAGING TIME				INTAKE-DERMAL = $\frac{CS \times SA \times SAF \times AE \times CF \times EF \times ED}{}$
CANCER	AT	70	years	BW x AT x 365 days/yr
NONCANCER	AT	24	years	
DERMAL ABSORPTION	AE	Chemical-specific	unitless	
EFFICIENCY				
Notes:				
For noncarcinogenic effects: AT = ED				
The dermal absorption efficiency is from the Risk Assessment Guidance for Superfund Volume 1:	sk Assessment Guidance	or Superfund Volume 1:		
Human Health Evaluation Manual Supplemental Guidance Dermal Risk Assessment, 1998.	I Guidance Dermal Risk /	Assessment, 1998.		
*The lesser of the 95 % upper confidence limit (UCL) & maximum concentration.	(UCL) & maximum cone	entration.		
ND = Value not determined	Douganot emphated			

RES-SS2R INCIDENTAL INGESTION OF AND DERMAL CONTACT WITH SURFACE SOIL - RME UNRESTRICTED LAND USE - ADULT RESIDENT AOC 57 AREA 2 RECREATIONAL FORT DEVENS, MA

## CARCINOGENIC EFFECTS

-μ	% %	
ercent Kotal Risk	86.35% 13.65%	
C X	36.	***
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	1.7E-05 2.6E-06	Š
TOTAL CANCER RISK	P P	꿃
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	2.1E-06 1.2E-06	Õ.
ANCER RISK DERMAL	.1E	7
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. <u>v</u>	1.4E-05	E-03
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ANCER RIS INGESTION		
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FACTOR Dermal Igre-Gay)-1	1.6E+00 2.5E+00	
CANCER SLOPE FACTOR ORAL DEROFAL mg/kg-dai/y-1 (dig/kg-dai/)	古 古	渕
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CANCERSEO ORAL (mg/kg-day)-1	1.5E+00 2.0E+00	18
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	1.3E-06 4.7E-07	
INTAKE DERMAL mg/kg-day)	可可	
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DERMAL ABSORPTION EFFICIENCY	0.03	
DERMAL ABSORPTION EFFICIENCY	0 0	
DERMAL SORPTION FICTENCY		
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KE (ION day)	9.6E-06 7.2E-07	
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47.9         2.8E-05         0.03         3.9E-06         3.0E-04         2.9E-04         9.4E-02         1.3E-02         1.1E-01           7920         4.6E-03         ND         7.1E-02         ND         7.1E-02         ND         2.3E-03         2.3E-03           273         1.6E-04         ND         7.1E-02         ND         7.1E-02         ND         2.3E-03         2.3E-03           3.6         2.1E-06         0.17         9.7E-06         6.0E-01         5.5E-01         2.1E-05         1.8E-05         1.8E-05         1.9E-01           17         1.0E-05         0.17         7.9E-06         3.0E-02         2.7E-02         3.3E-04         2.9E-04         6.2E-04           298         1.7E-04         0.17         1.7E-03         6.0E+00         3.6E-04         3.6E-04         3.6E-04         6.6E-04           1130         6.6E-04         0.17         1.7E-03         3.0E-02         2.2E-02         1.9E-02         1.9E-02         1.9E-02	COMPOUND	SOIL CONCENTRATION (mg/kg)	INTAKE INGESTION (mg/kg:day)	DERMAL ABSORPTION EFFICEENCY	INTAKE DERMAL (mg/kg-day)	REFERENCE DOSE  ORAL  ORAL  (vig/kg-doy) (vig/kg/kg	E DOSE DERNAL (mg/kg-day)	HAZARD QUOTIENT INGESTION	HAZARD QUOTIENT DERMAL	TOTAL HAZARD QUOTTENT	PERCENT TOTAL RISK
rese         ND         ND         ND         A.6E-03         ND         A.6E-04         ND         A.1E-02         ND         A.1E-02         ND         A.1E-02         ND         A.1E-02         ND         A.1E-02         ND         A.1E-03         A.1E-03         A.1E-03         A.1E-03         A.1E-03         A.1E-03         A.1E-03         A.1E-03         A.1E-03         A.1E-03         A.1E-03         A.1E-03         A.1E-03         A.1E-03         A.1E-03         A.1E-03         A.1E-03         A.1E-03         A.1E-03         A.1E-03         A.1E-03         A.1E-03         A.1E-03         A.1E-03         A.1E-03         A.1E-03         A.1E-03         A.1E-02         A.1E-02         A.1E-02         A.1E-02         A.1E-02         A.1E-02         A.1E-02         A.1E-02         A.1E-02         A.1E-02         A.1E-02         A.1E-02         A.1E-02         A.1E-02         A.1E-02         A.1E-02         A.1E-02         A.1E-02         A.1E-02         A.1E-02         A.1E-02         A.1E-02         A.1E-02         A.1E-02         A.1E-02         A.1E-02         A.1E-02         A.1E-02         A.1E-02         A.1E-02         A.1E-02         A.1E-02         A.1E-02         A.1E-02         A.1E-02         A.1E-02         A.1E-02         A.1E-02         A	Arsenic	47.9	2.8E-05	0.03	3.9E-06	3.0E-04	2.9E-04	9.4E-02	1.35-02	1.1E-01	31.14%
rese         273         1.6E-04         ND         7.1E-02         ND         2.3E-03         2.3E-03         2.3E-03           r-1260         3.6         2.1E-06         0.14         1.4E-06         2.0E-05         1.6E-05         1.1E-01         8.6E-02         1.9E-01           2 Aliphatics         2.1         2.1E-05         0.17         9.7E-06         6.0E-01         5.5E-01         2.1E-05         3.8E-05           3 Aliphatics         2.9         1.7E-04         0.17         1.4E-04         6.0E-01         5.5E-01         2.9E-04         5.4E-04           3 Aliphatics         3.640         2.1E-03         0.17         1.7E-03         6.0E+00         5.5E+00         3.6E-04         5.4E-04           2.3 Anomatics         1.30         0.17         1.7E-03         3.0E-02         2.7E-02         1.9E-02         4.1E-02	Iron	7920	4.6E-03	QX	-	QN					
2 Aliphatics         2.1 E-04         0.14 P-06         2.0 E-05         1.6 E-05         1.1 E-01         8.6 E-02         1.9 E-01         3.8 E-02           2 Aliphatics         2.1 E-05         0.17         9.7 E-06         6.0 E-01         5.5 E-01         2.1 E-05         1.8 E-05         3.8 E-05           3 Aliphatics         2.9 R-04         0.17         7.9 E-06         3.0 E-02         2.7 E-02         3.3 E-04         6.2 E-04           3 Aliphatics         2.9 R-04         0.17         1.4 E-04         6.0 E-01         5.5 E+00         3.6 E-04         5.4 E-04           3 Aliphatics         3.6 Aliphatics         3.6 B-03         0.17         1.7 E-03         6.0 E-01         3.6 E-04         5.5 E-04           3 Anomatics         1.3 B-03         0.17         1.7 E-03         3.0 E-02         2.7 E-02         1.9 E-02         4.1 E-02	Manganese	273	1.6E-04	QN		7.1E-02	Q	2.3E-03		2.3E-03	0.66%
2 Aliphatics         2.1         2.1         2.1         2.1         2.1         2.1         2.1         3.8         2.0         3.8         3.0         3.0         3.0         3.0         3.0         3.0         3.0         3.0         3.0         3.0         3.0         3.0         3.0         3.0         3.0         3.0         3.0         3.0         3.0         3.0         3.0         3.0         3.0         3.0         3.0         3.0         3.0         3.0         3.0         3.0         3.0         3.0         3.0         3.0         3.0         3.0         3.0         3.0         3.0         3.0         3.0         3.0         3.0         3.0         3.0         3.0         3.0         3.0         3.0         3.0         3.0         3.0         3.0         3.0         3.0         3.0         3.0         3.0         3.0         3.0         3.0         3.0         3.0         3.0         3.0         3.0         3.0         3.0         3.0         3.0         3.0         3.0         3.0         3.0         3.0         3.0         3.0         3.0         3.0         3.0         3.0         3.0         3.0         3.0         3.0 <t< td=""><td>Aroclor-1260</td><td>3.6</td><td>2.1E-06</td><td>0.14</td><td>1.4E-06</td><td>2.0E-05</td><td>1.6E-05</td><td>1.1E-01</td><td>8.6E-02</td><td>1.9E-01</td><td>82.61%</td></t<>	Aroclor-1260	3.6	2.1E-06	0.14	1.4E-06	2.0E-05	1.6E-05	1.1E-01	8.6E-02	1.9E-01	82.61%
21 1.2E-05 0.17 9.7E-06 6.0E-01 5.5E-01 2.1E-05 1.8E-05 3.8E-05 3.8E-05 2.0E-01 5.5E-01 2.1E-05 1.8E-05 3.8E-05 3.8E-05 3.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-05 1.0E-04 0.17 1.4E-04 6.0E-01 5.5E-01 3.6E-04 3.1E-04 6.0E-04 1.0E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1.9E-02 1	VPH									,	
17         1.0E-05         0.17         7.9E-06         3.0E-02         2.7E-02         3.3E-04         2.9E-04         6.2E-04           298         1.7E-04         0.17         1.4E-04         6.0E-01         5.5E-01         2.9E-04         2.5E-04         5.4E-04           3.640         2.1E-03         0.17         1.7E-03         6.0E+00         5.5E+00         3.6E-04         3.1E-04         6.6E-04           1130         6.6E-04         0.17         5.2E-04         3.0E-02         1.9E-02         1.9E-02         4.1E-02	C9-C12 Aliphatics	21	1.2E-05	0.17	9.7E-06	6.0E-01	5.5E-01	2.1E-05	1.8E-05	3.8E-05	0.01%
298       1.7E-04       0.17       1.4E-04       6.0E-01       5.5E-01       2.9E-04       2.5E-04       5.4E-04         3.640       2.1E-03       0.17       1.7E-03       6.0E+00       5.5E+00       3.6E-04       3.1E-04       6.6E-04         1130       6.6E-04       0.17       5.2E-04       3.0E-02       2.7E-02       1.9E-02       4.1E-02	C9-C10 Aromatics	17	1.0E-05	0.17	7.9E-06	3.0E-02	2.7E-02	3.3E-04	2.9E-04	6.2E-04	0.18%
298         1.7E-04         0.17         1.4E-04         6.0E-01         5.5E-01         2.9E-04         2.5E-04         5.4E-04           3,640         2.1E-03         0.17         1.7E-03         6.0E+00         5.5E+00         3.6E-04         3.1E-04         6.6E-04           1130         6.6E-04         0.17         5.2E-04         3.0E-02         2.7E-02         1.9E-02         4.1E-02	ЕРН										
3,640 2.1E-03 0.17 1.7E-03 6.0E+00 5.5E+00 3.6E-04 3.1E-04 6.6E-04 6.6E-04 1.9E-02 1.9E-02 1.9E-02 4.1E-02	C9-C18 Aliphatics	298	1.7E-04	0.17	1.4E-04	6.0E-01	5.SE-01	2.9E-04	2,5E-04	5.4E-04	0.16%
1130 6.6E-04 0.17 5.2E-04 3.0E-02 2.7E-02 1.9E-02 1.9E-02 4.1E-02	C19-C36 Aliphatics	3.640	2.1E-03	0.17	1.7E-03	6.0E+00	5.5E+00	3.6E-04	3.1E-04	6.6E-04	0.19%
	C11-C22 Aromatics	1130	6.6E-04	0.17	5.2E-04	3.0E-02	2.7E-02	2.2E-02	1.9E-02	4.1E-02	12.05%

RES-SSZK INHALATION EXPOSURE TO PARTICULATES IN SURFACE SOIL - RME UNRESTRICTED LAND USE - ADULT RESIDENT AOC 57 AREA 2 RECREATIONAL FORT DEVENS, MA

### EXPOSURE PARAMETERS

	CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR (mg/kg-day)-1		HAZARD QUOTIENT = INTAKE (mg/kg-day) / REFERENCE CONCENTRATION (mg/kg-day)			INTAKE - INHALATION = $\frac{(CA_D + Ca_V) \times RAF \times IhR \times ET \times EF \times ED}{}$	BW x AT x 365 days/yr			AIR CONCENTRATION PARTICULATES = CS x 1/PEF		AIR CONCENTRATION VOLATILES = CS x 1/VF	(VF not calculated because there are no VOCs selected as CPCs).					
CINTS	mg/kg	mg/m³	mg/m³	m³/kg	ug/m³	m³/hour	kg	hours/day	days/year	years			years	years				
VALUE	See below	Calculated	Calculated	Calculated	1.32E+09	0.63	02	∞	120	24	100%		70	24	& maximum concentration			
SYMBOL	CS	CAp	CAv	VF	PEF	IhR	BW	ET	#B	Œ	RAF		AT	AT		1 сопсети.		
P. RAWELLER	CONCENTRATION SOIL*	CONCENTRATION AIR PARTICULATES	CONCENTRATION AIR VOLATILES	VOLATILIZATION FACTOR**	PARTICULATE EMISSIONS FACTOR	INHALATION RATE	BODY WEIGHT	EXPOSURE TIME	EXPOSURE FREQUENCY	EXPOSURE DURATION	RELATIVE ABSORPTION FACTOR	AVERAGING TIME	CANCER	NONCANCER	Notes: * Soil concentration used is the lesser of the 95 % upper confidence limit (UCL	**Volatifization factor used only for volatile chemicals of potential concern.	For noncarcinogenic effects: AT = ED	ND = Value not determined



RES-SS2R INHALATION EXPOSURE TO PARTICULATES IN SURFACE SOIL - RME UNRESTRICTED LAND USE - ADULT RESIDENT AOC 57 AREA 2 RECREATIONAL FORT DEVENS, MA

#### CARCINOGENIC EFFECTS

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5	99.01%	
RCENT OTAL RISK	80	
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	Arsenic Aroclor-1260	1
	₹ ₹	1

PERCENT TOTAL RISK			6 60.70%			<u> </u>	3 0.0051%	, et coo o			5 0.29%	
HAZARD QUGTIENT			4.4E-04			8.3E-10	2.2E-08	, .	1.2E-08		1.3E-06	000'0
REFERENCE DOSE (ng/kg-day)	QN	QN	1.4E-05	ΩN		5.7E-01	1.7E-02	10 11	5.7E-01	QX	2.0E-02	SUMMARY HAZARD INDEX
INTAKE (mg/kg-day)	1.1E-09	1.8E-07	6.1E-09	8.1E-11		4.7E-10	3.8E-10	000	0./E-09	8.2E-08	2.5E-08	SUMMARY
ULATES (m²)	3.6E-08	90-30'9	2.1E-07	2.76-09		1.6E-08	1.3E-08	i c	70-36.7	2.8E-06	8.6E-07	
AIR CONCENTRATION VOLATILES PARTIC (mg/m²) (mg/m²)												
VF (m ² /kg)	NA	AN	NA	YN YY		AN	Y Y		A V	YY V	AN AN	
SOR. CONCENTRATION (@g/kg)	47.9	7920	273	3.6		21	17		298	3,640	1130	
диялодиюх	Arsenic	Iron	ganese	Aroclor-1260	М	712 Aliphatics	C9-C10 Aromatics	ЕРН	318 Aliphatics	C19-C36 Aliphatics	C11-C22 Aromatics	

RES-SOLK
INCIDENTAL INGESTION OF AND DERMAL CONTACT WITH SURFACE SOIL - RME
UNRESTRICTED LAND USE - CHILD RESIDENT (1 TO 6 YEARS)
AOC 57 AREA 2 RECREATIONAL
FORT DEVENS, MA

14-Mar-00

EXPOSURE PARAMETERS

PARAMETER	SYMBOL	VALUE	UNITS	
CONCENTRATION SOIL	CS	See Below*	mg/kg	CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR (mg/kg-day)-1
INGESTION RATE	IR	200	mg/day	
FRACTION INGESTED	E	%001		HAZARD QUOTIENT = INTAKE (mg/kg-day) / REFERENCE DOSE (mg/kg-day)
SOIL ADHERENCE FACTOR	SAF	_	mg/cm²	
SURFACE AREA EXPOSED	SA	2,045	cm²	INTAKE = (INTAKE-INGESTION) + (INTAKE-DERMAL)
CONVERSION FACTOR	ర	0.000001	kg/mg	•
BODY WEIGHT	BW	15	kg	INTAKE-INGESTION = $\frac{CS \times IR \times FI \times CF \times EF \times ED}{}$
EXPOSURE FREQUENCY	EF	150	days/year	BW x AT x 365 days/yr
EXPOSURE DURATION	ED	9	years	
AVERAGING TIME				INTAKE-DERMAL = $CS \times SA \times SAF \times AE \times CF \times EF \times ED$
CANCER	AT	70	years	BW x AT x 365 days/yr
NONCANCER	AT	9	years	
DERMAL ABSORPTION	AE	Chemical-specific	unitless	-
EFFICIENCY				
Notes:				
For noncarcinogenic effects: AT = ED				
The dermal absorption efficiency is from the Risk Assessment Guidance for Superfund Volume I:	Risk Assessment Guidance	for Superfund Volume I:		
Human Health Evaluation Manual Supplemental Guidance Dermal Risk Assessment, 1998.	ntal Guidance Dermal Risk	Assessment, 1998.		
*The lesser of the 95 % upper confidence limit (UCL) & maximum concentration.	uit (UCL) & maximum con	centration.		
ND = Value not determined	NE = Route not evaluated			

RES-SS2R INCIDENTAL INGESTION OF AND DERMAL CONTACT WITH SURFACE SOIL - RME UNRESTRICTED LAND USE - CHILD RESIDENT (1 TO 6 YEARS) AOC 57 AREA 2 RECREATIONAL FORT DEVENS, MA

#### CARCINOGENIC EFFECTS

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INTAKE DERMAL ng/kg-day)	6.9E-06 2.4E-06	
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DERMAL ABSORPTION EFFICTENCY	0.03	
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	SOIL CONCENTRATION (ing/kg)	INTAKE INGESTION (mg/kg-day)	DERMAL ABSORPTION EFFICIENCY	DERMAL (mg/kg-day)	ORAL DERN (mg/kg-day) (mg/kg	DERMAL (tig/kg-day)	QUOTIENT INCESTION	QUOTIENT	HAZARD	TOTAL
Arsenic	47.9	2.6E-04	0.03	8.05E-05	3.0E-04	2.9E-04	8.7E-01	2.8E-01	1.2E+00	25.29%
Iron	7920	4.3E-02	QX		ND	QN				
Manganese	273	1.5E-03	QN		7.15-02	QN	2.1E-02		2.1E-02	0.46%
Aroclor-1260	3.6	2.0E-05	0.14	2.8E-05	2.0E-05	1.6E-05	9.9E-01	1.8E+00	2.8E+00	60.37%
VPH										
C9-C12 Aliphatics	21	1.2E-04	0.17	2.0E-04	0.0E-01	5.5E-01	1.9E-04	3.6E-04	5.6E-04	0.01%
C9-C10 Aromatics	17	9.3E-05	0.17	1.6E-04	3.0E-02	2.7E-02	3.1E-03	6.0E-03	9.1E-03	0.20%
ЕРН										
C9-C18 Aliphatics	298	1.6E-03	0.17	2.8E-03	6.0E-01	5.5E-01	2.7E-03	5.2E-03	7.9E-03	0.17%
C19-C36 Alimhatics	3,640	2.0E-02	0.17	3.5E-02	6.0E+00	5.5E+00	3.3E-03	6.3E-03	9.6E-03	0.21%
C11-C22 Aronatics	1130	6.2E-03	0.17	1.1E-02	3.0E-02	2.7E-02	2.1E-01	4.0E-01	6.1E-01	13.28%

RES-SSR INHALATION EXPOSURE TO PARTICULATES IN SURFACE SOIL - RME UNRESTRICTED LAND USE - CHILD RESIDENT (1 TO 6 YEARS) AOC 57 AREA 2 RECREATIONAL FORT DEVENS, MA

#### EXPOSURE PARAMETERS

PARAMETER	SYMBOL	VALUE	UNITS	
CONCENTRATION SOIL*	S	See below	mg/kg	CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR (mg/kg-day)-1
CONCENTRATION AIR PARTICULATES	CAp	Calculated	mg/m³	
CONCENTRATION AIR VOLATILES	CAv	Calculated	mg/m³	HAZARD QUOTIENT = INTAKE (mg/kg-day) / REFERENCE CONCENTRATION (mg/kg-day)
VOLATILIZATION FACTOR**	VF	Calculated	m³/kg	
PARTICULATE EMISSIONS FACTOR	PEF	1.32E+09	ug/m³	
INHALATION RATE	IhR	0.31	m³/hour	INTAKE - INHALATION = $(CA_D + Ca_V) \times RAF \times IhR \times ET \times EF \times ED$
BODY WEIGHT	BW	15	kg	BW x AT x 365 days/yr
EXPOSURE TIME	ET	80	hours/day	
EXPOSURE FREQUENCY	EF	120	days/year	
EXPOSURE DURATION	<b>G</b>	9	years	AIR CONCENTRATION PARTICULATES = CS x 1/PEF
RELATIVE ABSORPTION FACTOR	RAF	100%		
AVERAGING TIME				AIR CONCENTRATION VOLATILES = CS x 1/VF
CANCER	AT	02	years	(VF not calculated because there are no VOCs selected as CPCs).
NONCANCER	AT	9	years	
Notes: * Soil concentration used is the lesser of the 95 % upper confidence limit (UCL) & maximum concentration	er confidence limit (UCL) & m	aximum concentration		
**Volatilization factor used only for volatile chemicals of potential concern.	ntial concern.			
For noncarcinogenic effects: AT = ED				
ND = Value not determined				

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RES-SS2R INHALATION EXPOSURE TO PARTICULATES IN SURFACE SOIL - RME UNRESTRICTED LAND USE - CHILD RESIDENT (1 TO 6 YEARS) AOC 57 AREA 2 RECREATIONAL FORT DEVENS, MA

CARCINOGENIC EFFECTS

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COMPOSED	SOUL CONCENTRATION (mg/kg)	V.F.	AIR CONCENTIATION  VOLATILES PARTIC  (mg/m²) (ng/m²)	ULATES /m²)	inTake (ngkg-day)	REFERENCE DOSE (mg/kg-day)	HAZARD QUOTIENT	PERCENT TOTAL RISK
Arsenic	47.9	NA		3.6E-08	2.5E-09	QN		
Iron	7920	YZ Y		90-30.9	4.1E-07	QN		
Manganese	273	A'N		2.1E-07	1.4E-08	1.4E-05	1.0E-03	%02.66
Aroclor-1260	3.6	YZ Z		2.7E-09	1.9E-10	Ω N		
VPH						1		,000
C9-C12 Aliphatics	21	AN A		1.65-08	1.15-09	5.7E-01	1.95-09	0.0001970
C9-C10 Aromatics	17	Y X		1.3E-08	8.8E-10	1.7E-02	5.1E-08	0.0051%
ЕРН				i		10 115	1 75 08	/02.000.0
C9-C18 Aliphatics	298	Y Y		7.3E-0/	1.55-08	5.7E-01	2.75-00	0.002770
C19-C36 Aliphatics	3,640	Y Y		2.8E-06	1.9E-07	ON		
C11-C22 Aromatics	1130	Z Z		8.6E-07	5.8E-08	2.0E-02	2.9E-06	0.29%
					SUMMARY	SUMMARY HAZARD INDEX	0.001	

RESSBAR
INCIDENTAL INGESTION OF AND DERMAL CONTACT WITH SUBSURFACE SOIL - RME
UNRESTRICTED LAND USE - ADULT RESIDENT
AOC 57 AREA 2 RECREATIONAL
FORT DEVENS, MA

03-Feb-00

EXPOSURE PARAMETERS

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CONCENTRATION SOIL	೮	See Below*	mg/kg	CANCER RISK = INTAKE	CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR (mg/kg-day)-1
INGESTION RATE	R	100	mg/day		
FRACTION INGESTED	FI	%001		HAZARD QUOTIENT = IP	HAZARD QUOTIENT = INTAKE (mg/kg-day) / REFERENCE DOSE (mg/kg-day)
SOIL ADHERENCE FACTOR	SAF	0.08	mg/cm²		
SURFACE AREA EXPOSED	SA	2,800	cm²	INTAKE = (INTAKE-ING)	INTAKE = (INTAKE-INGESTION) + (INTAKE-DERMAL)
CONVERSION FACTOR	Ç	0.000001	kg/mg		
BODY WEIGHT	BW	70	kg	INTAKE-INGESTION =	CS x IR x FI x CF x EF x ED
EXPOSURE FREQUENCY	EF	150	days/year		BW x AT x 365 days/yr
EXPOSURE DURATION	ED	24	years		
AVERAGING TIME				INTAKE-DERMAL =	CS x SA x SAF x AE x CF x EF x ED
CANCER	AT	70	years		BW x AT x 365 days/yr
NONCANCER	AT	24	years		
DERMAL ABSORPTION	AE	Chemical-specific	unitless		
EFFICIENCY				<u></u>	
Notes:					
For noncarcinogenic effects: AT = ED					
The dermal absorption efficiency is from the Risk Assessment Guidance for Superfund Volume 1:	sk Assessment Guidance	for Superfund Volume I:			
Human Health Evaluation Manual Supplemental Guidance Dermal Risk Assessment, 1998.	Il Guidance Dermal Risk	Assessment, 1998.			
*The lesser of the 95 % upper confidence limit (UCL) & nxximum concentration.	(UCL) & maximum cont	centration.			
ND = Value not determined	NF = Poute not evaluated				

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RES-SB2R
INCIDENTAL INGESTION OF AND DERMAL CONTACT WITH SUBSURFACE SOIL - RME
UNRESTRICTED LAND USE - ADULT RESIDENT
AOC 57 AREA 2 RECREATIONAL
FORT DEVENS, MA

#### CARCINOGENIC EFFECTS

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ERCENT FOTAL RUSK	44.34%		22%	2.14%	30%		
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	Arsenic	Lead	Dieldrin	loo	120		1

COMPOUND	CONCENTRATION (mg/kg)	INGESTION (mg/kg-day)	ABSORPTION EFFICTENCY	DERMAL (ng/kg-dry)	ORAL (mg/kg-day)	DERMAL (tag/kg-day)	RICESTION	QUOTIENT DERMAL	QUOTTENT	RISK
Aluminum	0269	4.1E-03	QN		QX	QN				
Arsenic	21	1.2E-05	0.03	1.7E-06	3.0E-04	2.9E-04	4.1E-02	5.9E-03	4.7E-02	3.23%
Chromium	2410	1.4E-03	QX		3.0E-03	7.5E-05	4.7E-01	0.0E+00	4.7E-01	32.43%
Iron	0889	4.0E-03	QN		QN	Q				
Lead	2000	3.0E-03	QN		QN	QZ				
Manganese	691	9.9E-05	QX		7.1E-02	4.3E-03	1.4E-03	0.0E+00	1.4E-03	0.10%
Dieldrin	0.0113	6.6E-09	S		5.0E-05	ΩN	1.3E-04		1.3E-04	0.01%
Aroclor-1248	0.482	2.8E-07	0.14	1.8E-07	2.0E-05	1.6E-05	1.4E-02	1.1E-02	2.6E-02	1.76%
Aroclor-1260	12	7.0E-06	0.14	4.6E-06	2.0E-05	1.6E-05	3.5E-01	2.9E-01	6.4E-01	43.89%
<u>VPH</u>										
C9-C12 Aliphatics	130	7.6E-05	0.17	6.0E-05	6.0E-01	5.5E-01	1.3E-04	1.1E-04	2.4E-04	0.05%
C9-C10 Aromatics	93	5.5E-05	0.17	4.3E-05	3.0E-02	2.7E-02	1.8E-03	1.6E-03	3.4E-03	0.23%
EPH										
C9-C18 Aliphatics	1860	1.1E-03	0.17	8.6E-04	6.0E-01	5.5E-01	1.8E-03	1.6E-03	3.4E-03	0.23%
C19-C36 Aliphatics	22700	1.3E-02	0.17	1.1E-02	6.0E+00	5.5E+00	2.2E-03	1.9E-03	4.1E-03	0.28%
C11-C22 Aromatics	7050	4.1E-03	0.17	3.3E-03	3.0E-02	2.7E-02	1.4E-01	1.2E-01	2.6E-01	17.80%

INHALATION EXPOSURE TO PARTICULATES IN SUBSURFACE SOIL - RME UNRESTRICTED LAND USE - ADULT RESIDENT AOC 57 AREA 2 RECREATIONAL FORT DEVENS, MA

#### EXPOSURE PARAMETERS

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PARAMETER	SYMBOL	VALUE	UNITS	
CONCENTRATION SOIL*	೮	See below	mg/kg	CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR (mg/kg-day)-1
CONCENTRATION AIR PARTICULATES	CAp	Calculated	mg/m³	
CONCENTRATION AIR VOLATILES	CAv	Calculated		HAZARD QUOTIENT = INTAKE (mg/kg-day) / REFERENCE CONCENTRATION (mg/kg-day)
VOLATILIZATION FACTOR**	VF	Calculated	m³/kg	
PARTICULATE EMISSIONS FACTOR	PEF	1.32E+09	ug/m³	
INHALATION RATE	IhR	0.63	m2/hour	INTAKE - INHALATION = <u>(CAp + Cav) x RAF x IhR x ET x EF x ED</u>
BODY WEIGHT	BW	70	kg	BW x AT x 365 days/yr
EXPOSURE TIME	ET	∞	hours/day	
EXPOSURE FREQUENCY	EF	150	days/year	
EXPOSURE DURATION	GB	24	years	AIR CONCENTRATION PARTICULATES = CS x 1/PEF
RELATIVE ABSORPTION FACTOR	RAF	%001		
AVERAGING TIME	, ,			AIR CONCENTRATION VOLATILES = $CS \times I/VF$
CANCER	AT	70	years	(VF not calculated because there are no VOCs selected as CPCs).
NONCANCER	AT	24	years	
Notes: * Soil concentration used is the lesser of the 95 % upper confidence limit (UCL) & maximum concentration	r confidence limit (UCL) & n	naximum concentration		
**Volatilization factor used only for volatile chemicals of potential concern.	tial concern.			
For noncarcinogenic effects: AT = ED				
ND = Value not determined				



RES-SB2R
INHALATION EXPOSURE TO PARTICULATES IN SUBSURFACE SOIL - RME
UINRESTRICTED LAND USE - ADULT RESIDENT
AOC 57 AREA 2 RECREATIONAL
FORT DEVENS, MA

#### CARCINOGENIC EFFECTS

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	Arsenic	romi	Lead	Dieldrin	Aroclor-1248	Aroclor-1260	

Aluminum	0269	NA	5.3E-06	1.6E-07	1.0E-03	1.6E-04	9.80%
Arsenic	21	NA	1.6E-08	4.7E-10	QN		
Chromium	2410	NA	1.8E-06	5.4E-08	2.9E-05	1.9E-03	81.07%
Iron	0889	NA	5.2E-06	1.5E-07	QN		
Lead	2060	NA	3.8E-06	1.1E-07	QN		
Manganese	691	NA	1.3E-07	3.8E-09	1.4E-05	2.7E-04	
Dieldrin	0.0113	NA	8.6E-12	2.5E-13	QV		
Aroclor-1248	0.482	N.A.	3.7E-10	1.1E-11	QN		
Aroclor-1260	12	NA	9.1E-09	2.7E-10	Q		
VPH		NA					
C9-C12 Aliphatics	130	NA	9.8E-08	2.9E-09	5.7E-01	5.1E-09	0.0002%
C9-C10 Aromatics	93	NA	7.0E-08	2.1E-09	1.7E-02	1.2E-07	0.005%
ЕРН		NA					
C9-C18 Aliphatics	1860	NA	1.4E-06	4.2E-08	5.7E-01	7.3E-08	0.003%
C19-C36 Aliphatics	22,700	NA	1.7E-05	5.1E-07	QN		
C11-C22 Aronatics	7050	NA	5.3E-06	1.6E-07	2.0E-02	7.9E-06	0.34%

INCIDENTAL INGESTION OF AND DERMAL CONTACT WITH SUBSURFACE SOIL - RME UNRESTRICTED LAND USE - CHILD RESIDENT (1 TO 6 YEARS)

AOC 57 AREA 2 RECREATIONAL
FORT DEVENS, MA

03-Feb-00

#### EXPOSURE PARAMETERS

PARAMETER	SYMBOL	VALUE	ONITS		
CONCENTRATION SOIL	S	See Below*	mg/kg	CANCER RISK - INTAKE	CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR (mg/kg-day)-1
INGESTION RATE	Ħ	200	mg/day	···	
FRACTION INGESTED	E	100%		HAZARD QUOTIENT = IN	HAZARD QUOTIENT = INTAKE (mg/kg-day) / REFERENCE DOSE (mg/kg-day)
SOIL ADHERENCE FACTOR	SAF		тg/ст²		
SURFACE AREA EXPOSED	SA	2,045	cuit	INTAKE = (INTAKE-ING)	NTAKE = (INTAKE-INGESTION) + (INTAKE-DERMAL)
CONVERSION FACTOR	5	1000000	kg/mg		
BODY WEIGHT	BW	15	kg	INTAKE-INGESTION =	CS x IR x FI x CF x EF x ED
EXPOSURE FREQUENCY	EF	120	days/year		BW x AT x 365 days/yr
EXPOSURE DURATION	ED	9	years		
AVERAGING TIME				INTAKE-DERMAL =	CS x SA x SAF x AE x CF x EF x ED
CANCER	AT	70	years		BW x AT x 365 days/yr
NONCANCER	AT	9	years		
DERMAL ABSORPTION	AE	Chemical-specific	unitless		
EFFICIENCY					
Notes:					
For noncarcinogenic effects: AT = ED					
The dermal absorption efficiency is from the Risk Assessment Guidance for Superfund Volume I:	sk Assessment Guidance	for Superfund Volume I:			
Human Health Evaluation Manual Supplemental Guidance Dermal Risk Assessment, 1998.	l Guidance Dermal Risk	Assessment, 1998.			
*The lesser of the 95 % upper confidence limit (UCL) & maximum concentration.	(UCL) & maximum con	centration.			
ND = Value not determined NE	E = Route not evaluated				

RES-SB2R INCIDENTAL INGESTION OF AND DERMAL CONTACT WITH SUBSURFACE SOIL - RME UNRESTRICTED LAND USE - CHILD RESIDENT (1 TO 6 YEARS)

AOC 57 AREA 2 RECREATIONAL FORT DEVENS, MA

#### CARCINOGENIC EFFECTS

COMPOUND	SOIL. CONCENTRATION (mg/kg)	INTAKE INGESTION (0)g/kg-day)	DERMAL ABSORPTION EPPICTENCY	INTAKE DERMAL (mg/kg-dny)	REFERENCE DOSE ORAL DERA (mg/kg-day) (mg/kg	E DOSE DERMAL (ng/kg-day)	HAZARD QUOTIENT ENGESTION	HAZARD QUOTIENT DERMAL	TOTAL HAZARD QUOTENT	PERCENT TOTAL RISK
Aluminum	0269	3.8E-02	QN		QN	QN				
Arsenic	21	1.2E-04	0.03	3.5E-05	3.0E-04	2.9E-04	3.8E-01	1.2E-01	5.1E-01	2.75%
Chromium	2410	1.3E-02	ΩN		3.0E-03	7.5E-05	4.4E+00	0.0E+00	4.4E+00	23.93%
Iron	0889	3.8E-02	QN		QN	ΩN				
Lead	2060	2.8E-02	QN		QN	QN				
Manganese	691	9.3E-04	QN		7.1E-02	4.3E-03	1.3E-02	0.0E+00	1.3E-02	0.01%
Dieldrin	0.0113	6.2E-08	QN		5.0E-05	QN	1.2E-03		1.2E-03	%10.0
Aroclor-1248	0.482	2.6E-06	0.14	3.8E-06	2.0E-05	1.6E-05	1.3E-01	2.4E-01	3.7E-01	2.00%
Aroclor-1260	12	6.6E-05	0.14	9.4E-05	2.0E-05	1.6E-05	3.3E+00	5.9E+00	9.2E+00	49.85%
VPH										
C9-C12 Aliphatics	130	7.1E-04	0.17	1.2E-03	6.0E-01	5.5E-01	1.2E-03	2.3E-03	3.4E-03	0.02%
C9-C10 Aronatics	93	5.1E-04	0.17	8.9E-04	3.0E-02	2.7E-02	1.7E-02	3.3E-02	5.0E-02	0.27%
ЕРН										
C9-C18 Aliphatics	1860	1.0E-02	0.17	1.8E-02	6.0E-01	5.5E-01	1.7E-02	3.2E-02	4.9E-02	0.27%
C19-C36 Aliphatics	22700	1.2E-01	0.17	2.2E-01	6.0E+00	5.5E+00	2.1E-02	3.9E-02	6.0E-02	0.33%
C11-C22 Aronatics	7050	3.9E-02	0.17	6.7E-02	3.0E-02	2.7E-02	1.3E+00	2.5E+00	3.8E+00	20.52%
				SUMMARY	I SUMMARY HAZARD INDEX	×	101		181	

RES-SBZR INHALATION EXPOSURE TO PARTICULATES IN SUBSURFACE SOIL - RME UNRESTRICTED LAND USE - CHILD RESIDENT (1 TO 6 YEARS) AOC 57 AREA 2 RECREATIONAL FORT DEVENS, MA

#### EXPOSURE PARAMETERS

	See below ng/g CANCER RISK = INTAKE (ng/kg-day) x CANCER SLOPE FACTOR (ng/kg-day)-1	Calculated mg/m²	Calculated mg/m² HAZARD QUOTIENT = INTAKE (mg/kg-day) / REFERENCE CONCENTRATION (mg/kg-day)	Calculated m ^A /kg		0.31 m/hour INTAKE-INHALATION = (CAD + Cav) x RAF x link x ET x EF x ED	15 kg BW x AT x 365 days/yr	8 hours/day	150 days/year	6 years AIR CONCENTRATION PARTICULATES = CS x 1/PEF	100%	AIR CONCENTRATION VOLATILES = CS x 1/VF	70 years (VF not calculated because there are no VOCs selected as CPCs).	6 years	1.) & maximum concentration			
										6 years	100%			6 years	imum concentration			
SYMBOL	SO	САр	CAv	VF	PEF	JIR.	BW	EI	FE	<b>a</b>	RAF		AT	AT	er confidence limit (UCL) & max	intial concern.		
PARAMETER	CONCENTRATION SOIL*	CONCENTRATION AIR PARTICULATES	CONCENTRATION AIR VOLATILES	VOLATILIZATION FACTOR**	PARTICULATE EMISSIONS FACTOR	INHALATION RATE	BODY WEIGHT	EXPOSURE TIME	EXPOSURE FREQUENCY	EXPOSURE DURATION	RELATIVE ABSORPTION FACTOR	AVERAGING TIME	CANCER	NONCANCER	Notes: * Soil concentration used is the lesser of the 95 % upper confidence limit (UCL) & maximum concentration	**Volatilization factor used only for volatile chemicals of potential concern.	For noncarcinogenic effects: AT = ED	ND = Value not determined

RES-SB2R
INHALATION EXPOSURE TO PARTICULATES IN SUBSURFACE SOIL - RME
UNRESTRICTED LAND USE - CHILD RESIDENT (1 TO 6 YEARS)
AOC 57 AREA 2 RECREATIONAL
FORT DEVENS, MA

# CARCINOGENIC EFFECTS

TOTAL RISK	0.32%				0.001%			
CANCER RISK	1.4E-09			8.0E-13	4.3E-12	1.1E-10	EU. 128 (1) (1) (1)	
CANCEKSLUTE FACTOR (mg/kg-day)-1	1.5E+01	4.1E+01	QN	1.6E+01	2.0E+00	2.0E+00	: Axiono operation	・・ とりと とりとしい
INTAKE (mg/kg-day)		1.1E-08					Valvanda	A M C I A I A I A I A I A
STRATION PARTICULATES (ing/in!)	1.6E-08	1.8E-06	3.8E-06	8.6E-12	3.7E-10	9.1E-09		
AIR CONCET VOLATILES (night!)								
VF (m ⁷ /kg)	AN	NA				Ϋ́		
SOE CONCENTRATION (mg/kg)	21	2410	2060	0.0113	0.482	12		
COMPOUND	Arsenic	un un	Lead		-1248	Aroclor-1260		

Aliminim	10269	NA	5.3E-06	6 3.6E-07	1.0E-03	3.6E-04	6.80%
Arsenic	21	AN	1.6E-08	8 1.1E-09	QN		
Chromium	2410	ΑN	1.8E-06	6 1.2E-07	2.9E-05	4.3E-03	81.07%
Iron	0889	NA AN	5.2E-06	6 3.5E-07	QN		
, ead	20905	AN	3.8E-06	6 2.6E-07	ON.		
Manyanese	169	NA	1.3E-07	7 8.7E-09	1.4E-05	6.2E-04	11.78%
Dieldrin	0.0113	NA	8.6E-12	2 5.8E-13	QN		
Amclor-1248	0.482	NA	3.7E-10	0 2.5E-11	QN		
Aroclor-1260	12	AN	9.1E-09	9 6.2E-10	QN		
HdA		NA				•	
C9-C12 Aliphatics	130	NA	9.8E-08	8 6.7E-09	5.7E-01	1.2E-08	
C9-C10 Aronatics	93	A Z	7.0E-08	8 4.8E-09	1.7E-02	2.8E-07	0.005%
EPH		NA					,
C9-C18 Aliphatics	1860	AN	1.4E-06		5.7E-01	1.7E-07	0.003%
C19-C36 Aliphatics	22,700	AN	1.7E-05	5 1.2E-06	Q		
C11-C22 Aromatics	7050	AN	5.3E-06	6 3.6E-07	2.0E-02	1.8E-05	0.34%

RES-CW21
INGESTION OF GROUNDWATER AS DRINKING WATER (UNFILTERED SAMPLES) - RME
UNRESTRICTED LAND USE - ADULT RESIDENT
AOC 57 AREA 2 RECREATIONAL
FORT DEVENS, MA

#### EXPOSURE PARAMETERS

	SYMBOL:	* WEUE		
CONCENTRATION WATER	CW	chemical-specific		CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR (mg/kg-day)-1
INGESTION RATE	ĸ	2		
BODY WEIGHT	BW	0/	kg	HAZARD QUOITIENT = INTAKE (mg/kg-day) / REFERENCE DOSE (mg/kg-day)
CONVERSION FACTOR	ភូ	100.0	gn/gm	
EXPOSURE FREQUENCY	된	350	days/year	
EXPOSURE DURATION	æ	30	years	INTAKE - CWAIRAEFAEDACE
AVERAGING TIME				BW x AT x 365 days/year
CANCER	AT	07	years	
NONCANCER	AT	30	years	
Notes:				
For noncarcinogenic effects: AT = ED				

RES-GW21 INGESTION OF GROUNDWATER AS DRINKING WATER (UNFILTERED SAMPLES) - RME UNRESTRICTED LAND USE - ADULT RESIDENT AOC 57 AREA 2 RECREATIONAL FORT DEVENS, MA

CARCINOGENIC EFFECTS

Arsenie         544 ug/Liter         6.4E.04         1.5E+00         9.6E-04           Arodo-1266         2.0E+00         2.0E+00         5.2E-06           Big/Lethylhev/liphithalate         4.7E-03         1.4E-02         6.6E-05           retrachloroeithylene         1.9E-04         5.2E-02         9.8E-06           Irikchloroeithylene         1.9E-04         2.2E-05         1.1E-02         2.5E-07	омроимо			(mg/kg-day)	PACTIOR (dig/kg-thiy)*-1	INGESTION
0.22 ug/Liter 2.6E-06 2.0E+00 400 ug/Liter 4.7E-03 1.4E-02 15 ug/Liter 1.9E-04 5.2E-02 1.1E-02		54.4	ug/Liter	6.4E-04	11	9.6E-04
400 ug/Liter 4.7E-03 1.4E-02 16 ug/Liter 1.9E-04 5.2E-02 1.9 ug/Liter 2.2E-05 1.1E-02		0.22	ug/Liter	2.6E-06	2.05+00	5.2E-06
16 ug/Liter 1.9E-04 5.2E-02 1.9 ug/Liter 2.2E-05 1.1E-02	ate	400	ug/Liter	4.7E-03	1.46-02	6.6E.05
2.2E-05 1.1E-02	-	91	ug/Liter	1.9E-04	5.26-02	9.8E-06
		6:1	ug/Liter	2.2E-05	1.16-02	2.5E-07

	CONCENTRATION	INGESTION (mg/kg-tay)	DOSE (mg/kg-day):	QUOTIENT INCESTION
Arsenic	54.4 lug/Liter	1.5E-03	3.06-04	5.0E+00
ron	3610 lug/Liter	9.9E-02	QN	
Janeanese	724 ug/Liter	2.0E-02	2.46-02	8.3E-01
Vroctor-1260	0.22 ug/Liter	90-30·9	2.0E-05	3.0E-01
Bis(2-ethythexyl)obflialate	400 ug/Liter	1.16-02	2.0E-02	S.SE-01
2-Dichloroethylene	13 ug/Liter	3.6E-04	9.0E-03	4.0E-02
letrachiocosthylene	16 ug/Liter	4.4E-04	1.0E-02	4.4E-02
Trichioroethylene	1.9 ug/Liter	5.2E-05	6.0E-03	8.7E-03

MAIN-SSSI
INCIDENTAL INGESTION OF AND DERMAL CONTACT WITH SURFACE SOIL - RME
FUTURE/CURRENT MAINTENANCE WORKER
AOC 57 AREA 3 INDUSTRIAL
FORT DEVENS, MA

14-Mar-00

#### EXPOSURE PARAMETERS

PARAMETER	SYMBOL	VALUE	UNITS		
CONCENTRATION SOIL	S	See Below*	mg/kg	CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR (mg/kg-day)-1	lay)-1
INGESTION RATE	R	001	mg/day		
FRACTION INGESTED	E	%001		HAZARD QUOTIENT = INTAKE (mg/kg-day) / REFERENCE DOSE (mg/kg-day)	ay)
SOIL ADHERENCE FACTOR	SAF	0.024	mg/cm²		
SURFACE AREA EXPOSED	SA	009,11	CILL	INTAKE = (INTAKE-INGESTION) + (INTAKE-DERMAL)	
CONVERSION FACTOR	£	0.000001	kg/mg		
BODY WEIGHT	BW	07	kg	INTAKE-INGESTION = CS x IR x FI x CF x EF x ED	
EXPOSURE FREQUENCY	EF	52	_	BW x AT x 365 days/yr	
EXPOSURE DURATION	<b>B</b>	25	years		
AVERAGING TIME				INTAKE-DERMAL = CSxSAxSAFxAExCFxEFxED	
CANCER	AT	70	years	BW x AT x 365 days/yr	
NONCANCER	AT	25	years		
DERMAL ABSORPTION	AE	Chemical-specific	unitless		
EFFICIENCY					
Notes:					
For noncarcinogenic effects: AT = ED					
The dermal absorption efficiency is from the Risk Assessment Guidance for Superfund Volume I:	sk Assessment Guidance	for Superfund Volume 1:			
Human Health Evaluation Manual Supplemental Guidance Dermal Risk Assessment, 1998.	d Guidance Dermal Risk	Assessment, 1998.			
*The lesser of the 95 % upper confidence limit (UCL) & maximum concentration.	(UCL) & maximum cond	entration.			
The exposure frequency is assumed to be 1 day a week from May 1st to October 31st.	a week from May 1st to	October 31st.			
ND = Value not determined					

MAIN-SS31 INCIDENTAL INGESTION OF AND DERMAL CONTACT WITH SURFACE SOIL - RME FUTURE/CURRENT MAINTENANCE WORKER AOC 57 AREA 3 INDUSTRIAL FORT DEVENS, MA

#### CARCINOGENIC EFFECTS

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5 5 1	100.00%	
S X E	0.0	
R O K	10	
2		
	4.9E-06	9
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ANCE RISK	1.9	47
0 2 2	7	
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INTAKE Dermai mg/kg-day	SE	
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DERMAL SORPTION FFICTENCY	ö	
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COMPOUND	SOIL CONCENTRATION (mg/kg)	INTAKE INGESTION (mg/kg-day)	DERMAL ABSORPTION RPRICERNCY	INTAKE DERMAL (mg/kg-day)	REFERENCE DOSE ORAL DERA (DIRRE-(193)) (INRING	E DOSE DERMAL (ng/kg-day)	HAZARD QUOTIENT INGESTION	BAZARD QUOTIENT DERMAL	TOTAL HAZARD QUOTTENT	PERCENT TOTAL RISK
Arsenic	41	8.3E-06	0.03	7.0E-07	3.0E-04	2.9E-04	2.8E-02	2.4E-03	3.0E-02	94.57%
Iron	8040	1.6E-03	QN		QN	QN				
Manganese	548	1.1E-04	ΩN		7.1E-02	ΩN	1.6E-03		1.6E-03	4.92%
VPH										
C9-C12 Aliphatics	91	3.3E-06	0.17	1.5E-06	6.0E-01	5.5E-01	5.4E-06	2.8E-06	8.2E-06	0.03%
C9-C10 Aromatics	4.85	9.9E-07	0.17	4.7E-07	3.0E-02	2.7E-02	3.3E-05	1.7E-05	5.0E-05	0.16%
EPH										
C9-C18 Aliphatics	3.63	7.4E-07	0.17	3.5E-07	6.0E-01	5.5E-01	1.2E-06	6.4E-07	1.9E-06	%900.0
C19-C36 Alfohatics	38	7.7E-06	0.17	3.7E-06	6.0E+00	5.5E+00	1.3E-06	6.7E-07	2.0E-06	%900.0
C11-C22 Aromatics	01	2.0E-06	0.17	9.4E-07	3.0E-02	2.7E-02	6.6E-05	3.5E-05	1.0E-04	0.32%
									3.00	
				SUMMARY	SUMMARY HAZAKU INDEX		6,03	1000 M. W. W. W. W. W. W. W. W. W. W. W. W. W.	1 CO O	

MAIN-SS3I INHALATION EXPOSURE TO PARTICULATES IN SURFACE SOIL - RME FUTURE/CURRENT MAINTENANCE WORKER AOC 57 AREA 3 INDUSTRIAL FORT DEVENS, MA

#### EXPOSURE PARAMETERS

EQUATIONS

	mg/kg CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR (mg/kg-day)-1		mg/m² HAZARD QUOTIENT = INTAKE (mg/kg-day) / REFERENCE CONCENTRATION (mg/kg-day)	m ³ /kg		m ³ /hour INTAKE - INHALATION = (CAp + Cav) x RAF x IhR x ET x EF x ED	kg BW x AT x 365 daysyr	hours/day	days/year	years AIR CONCENTRATION PARTICULATES = CS x 1/PEF		AIR CONCENTRATION VOLATILES = CS x I/VF	years (VF not calculated because there are no VOCs selected as CPCs).	years	
VALUE	See below	Calculated	Calculated	Calculated	1.32E+09	1.6	70	∞	25	25	100%	-	20	25	iximum concentration
SYMBOL	S	CAp	CAv	VF	PEF	IhR	BW	ЕТ	H	<b>G</b>	RAF		AT	AT	onfidence limit (UCL) & т   сопсет.
THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE TANK THE	CONCENTRATION SOIL*	CONCENTRATION AIR PARTICULATES	CONCENTRATION AIR VOLATILES	VOLATILIZATION FACTOR**	PARTICULATE EMISSIONS FACTOR	INHALATION RATE	BODY WEIGHT	EXPOSURE TIME	EXPOSURE PREQUENCY	EXPOSURE DURATION	RELATIVE ABSORPTION FACTOR	AVERAGING TIME	CANCER	NONCANCER	Notes: * Soil concentration used is the lesser of the 95 % upper confidence limit (UCL) & maximum concentration **Volatilization factor used only for volatile chemicals of potential concern.

ND = Value not determined

MAIN-SS3I INHALATION EXPOSURE TO PARTICULATES IN SURFACE SOIL - RME FUTURE/CURRENT MAINTENANCE WORKER AOC 57 AREA 3 INDUSTRIAL FORT DEVENS, MA

#### CARCINOGENIC EFFECTS

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	TOS		AIR CONCENTRATION	NTRATION		REFERENCE		PERCENT
COMPOUND	CONCENTRATION	*	VOLATILES	PARTICULATES INTAKE	INTAKE	3500	HAZARD	TOTAL
	(mg/kg)	(B/XB)	(mg/m1)	(n)g/m²) (n)g/kg-day)	(n)g/kg-day)	(ing/kg-day)	QUOTIENT	RISK
Arsenic	41	NA		3.1E-08	8.1E-10	QN		
Iron	8040			6.1E-06	1.6E-07	QN		
Manganese	548	AN		4.2E-07	1.1E-08	1.4E-05	7.7E-04	100.00%
HAY						1		
C9-C12 Aliphatics	16			1.2E-08	3.2E-10	5.7E-01	5.5E-10	0.00000072
C9-C10 Aromatics	4.85	Y Y		3.7E-09	9.6E-11	1.7E-02	5.6E-09	0.0000073
ЕРН								,
C9-C18 Aliphatics	3.6	Y.		5.8E-09	7.2E-11	5.7E-01	1.3E-10	0.00000016
C19-C36 Aliohatics	38	NA		2.9E-08	7.5E-10	Q		
C11-C22 Aroundies	01	AN A		7.4E-09	1.9E-10	2.0E-02	9.6E-09	0.000012
					SUMMARY	SUMMARY HAZARD INDEX	0.0008	

MAIN-SS3I(CT)
INCIDENTAL INGESTION OF AND DERMAL CONTACT WITH SURFACE SOIL - CENTRAL TENDENCY
FUTURE/CURRENT MAINTENANCE WORKER
AOC 57 AREA 3 INDUSTRIAL
FORT DEVENS, MA

14-Mar-00

August 1992

EXPOSURE PARAMETERS

PARAMETER	SYMBOL	VALUE	UNITS		
CONCENTRATION SOIL	SS	See Below*	mg/kg	CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR (mg/kg-day)-1	
INGESTION RATE	Ħ	50	mg/day		
FRACTION INGESTED	E	100%		HAZARD QUOTIENT = INTAKE (mg/kg-day) / REFERENCE DOSE (mg/kg-day)	
SOIL ADHERENCE FACTOR	SAF	0.024	mg/cm²		
SURFACE AREA EXPOSED	SA	11,600	cm ²	INTAKE = (INTAKE-INGESTION) + (INTAKE-DERMAL)	
CONVERSION FACTOR	ຽ	0.00001	kg/mg		
BODY WEIGHT	BW	02	kg	INTAKE-INCESTION # CS.x.IR.x.Fl.x.CF.x.EF.x.ED	
EXPOSURE FREQUENCY	EF.	26	days/year	BW x AT x 365 daystyr	
EXPOSURE DURATION	<b>G</b>	9.9	years		
AVERAGING TIME				$INTAKE-DERMAL = CS \times SA \times SAF \times AE \times CF \times EF \times ED$	
CANCER	AT	20	years	BW x AT x 365 days/yr	
NONCANCER	AT	9.9	years		
DERMAL ABSORPTION	AE	Chemical-specific	unitless		_
EFFICIENCY					
Notes:					
For noncarcinogenic effects: AT = ED					
The dermal absorption efficiency is from the Risk Assessment Guidance for Superfund Volume I:	Risk Assessment Guidance	for Superfund Volume I:			
Human Health Evaluation Manual Supplemental Guidance Dermal Risk Assessment, 1998.	ıtal Guidance Dermal Risk	Assessment, 1998.			
*The lesser of the 95 % upper confidence limit (UCL) & maximum concentration.	it (UCL) & maximum cond	entration.			
The exposure frequency is assumed to be 1 day a week from May 1st to October 31st.	ay a week from May 1st to	October 31st.			
ND = Value not determined					

MAIN-SS31(CT) INCIDENTAL INGESTION OF AND DERMAL CONTACT WITH SURFACE SOIL - CENTRAL TENDENCY FUTURE/CURRENT MAINTENANCE WORKER AOC 57 AREA 3 INDUSTRIAL FORT DEVENS, MA

#### CARCINOGENIC EFFECTS

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ανηροάνος	SOIL	INTAKE	DERMAL	INTAKE DERMAL	REFERENCE DOSE ORAL DERA	DERALAL	HAZARD QEOTIENT INCESTION	BAZARD QUOTIENT DFRMAI	TOTAL HAZARD OUOTIENT	PERCENT TOTAL RISK
Arsenic	41 41 41 41 41 41 41 41 41 41 41 41 41 4	2.1E-06	0.03	3.5E-07	3.0E-04		7.0E-03	1.2E-03	8.2E-03	94.80%
Iron	8040	4.1E-04	DN		QN	ΩN				
Manganese	548	2.8E-05	ΩN		7.1E-02	ΩZ	3.9E-04		3.9E-04	4.56%
VPH C9-C12 Alimbatics	91	8.1E-07	0.17	7.7E-07	6.0E-01	5.5E-01	1.4E-06	1.4E-06	2.8E-06	0.03%
C9-C10 Aromatics	4.85	2.5E-07	0.17	2.3E-07	3.0E-02	2.7E-02	8.2E-06	8.7E-06	1.7E-05	0.20%
EPH Co C18 Alimbration	191	1.8F-07	0.17	1.7E-07	6.0E-01	5.5E-01	3.1E-07	3.2E-07	6.3E-07	0.007%
C2-C18 Amphatics C19-C36 Aliphatics	38		0.17		6.0E+00	5.5E+00	3.2E-07	3,3E-07	6.5E-07	0.008%
C11-C22 Aromatics	10	5.0E-07	0.17	4.7E-07	3.0E-02	2.7E-02	1.7E-05	1.7E-05	3.4E-05	0.39%
				SUMMARY	L SUMMARY HAZARD INDEX	X:::::::::::::::::::::::::::::::::::::	200.0	2100:00:00:15	6000	
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MAIN-SSSICT)
INHALATION EXPOSURE TO PARTICULATES IN SURFACE SOIL - CENTRAL TENDENCY
FUTURE/CURRENT MAINTENANCE WORKER
AOC 57 AREA 3 INDUSTRIAL
FORT DEVENS, MA

EXPOSURE PARAMETERS

	CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR (mg/kg-day)-1		HAZARD QUOTIENT = INTAKE (mg/kg-day) / REFERENCE CONCENTRATION (mg/kg-day)			INTAKE - INHALATION = $\frac{(CAp + Cav) \times RAF \times IhR \times ET \times EF \times ED}{A}$	BW x AT x 365 days/yr			AIR CONCENTRATION PARTICULATES = $CS \times 1/PEF$		AIR CONCENTRATION VOLATILES = CS x 1/VF	(VF not calculated because there are no VOCs selected as CPCs).					
UNITS	mg/kg C		mg/m³	m³/kg			kg	hours/day	days/year	years	-	<u> </u>	years	years				
VALUE	See below	Calculated	Calculated	Calculated	1.32E+09	1.6	70	∞	26	9.9	%001		02	9.9	maximum concentration			
SYMBOL	S	CAp	CAv	VF	PEF	IhR	BW	ET	댐	<b>B</b>	RAF		AT	AT	confidence limit (UCL) &	al concern.		
PARAMETER	CONCENTRATION SOIL*	CONCENTRATION AIR PARTICULATES	CONCENTRATION AIR VOLATILES	VOLATILIZATION FACTOR**	PARTICULATE EMISSIONS FACTOR	INHALATION RATE	BODY WEIGHT	EXPOSURE TIME	EXPOSURE FREQUENCY	EXPOSURE DURATION	RELATIVE ABSORPTION FACTOR	AVERAGING TIME	CANCER	NONCANCER	Notes: * Soil concentration used is the lesser of the 95 % upper confidence limit (UCL) & maximum concentration	**Volatilization factor used only for volatile chemicals of potential concern.	For noncarcinogenic effects: AT = ED	ND = Value not determined

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MAIN-SS3I(CT)
INHALATION EXPOSURE TO PARTICULATES IN SURFACE SOIL - CENTRAL TENDENCY
FUTURE/CURRENT MAINTENANCE WORKER
AOC 57 AREA 3 INDUSTRIAL
FORT DEVENS, MA

CARCINOGENIC EFFECTS

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REFERENCE PERCENT  DOSE HAZARD TOTAL  (hg/kg-iay) QUOTIENT RISK	ΩN		1.4E-05 3.9E-04 100.00%	5 7E-01 0.00000072		1.7E-02 2.8E-09 0.00000/3	8 7E 01	11-200		2.0E-02 4.8E-09 0.000012	
			5.4E-09	1 6F-10		4.8E-11				9.6E-11	
AIR CONCENTRATION THES PARTICULATES INTAKE (mg/kg-day)	3.1E-08	6.1E-06	4.2E-07	1 25-08	20-77:1	3.7E-09	100	7.8E-U9	2.9E-08	7.4E-09	
AIRCONC VOLATILES (tig/m²)						_					
(\$14,ca))	I NA		NA NA	2		NA			Y'A	NA	
SOR. CONCENTRATION (mg/kg)	41	8040	548	•	_	4.85		3.6	38	10	
COMPORIND	Arsenic	Iron	Manganese	HdA	C9-C12 Aliphatics	C9-C10 Aromatics	HAT	C9-C18 Aliphatics	C19-C36 Aliphatics	C11-C22 Aromatics	

CWFW-SS31
INCIDENTAL INGESTION OF AND DERMAL CONTACT WITH SURFACE SOIL - RME
FUTURE COMMERCIAL/INDUSTRIAL WORKER
AOC 57 AREA 3 INDUSTRIAL
FORT DEVENS, MA

14-Mar-00

August 1992

EXPOSURE PARAMETERS

CONCENTRATION SOIL	mg/kg mg/day mg/cm² cm² kg/mg kg days/yeur years
R	mg/day mg/cm² cm² kg/mg kg days/year years
R	mg/cm² cm² kg/mg kg daysiyear years
R	ng/cm² INTAKE = (INTAKE-INGES kgmg kg INTAKE-INGESTION = days/year years intake-ingebaai =
SA   12,731   cm²   INTAKE=(INTAKE-INGES)   CF   0.000001   kg/mg   kg/mg   INTAKE-INGESTION =	cnr INTAKE = (INTAKE-INGES) kg INTAKE-INGESTION = days/year years intake-ingestion =
ANCER AT 70 kg/mg INTAKE-INGESTION = 8 kg/mg   NTAKE-INGESTION = 150 days/yeur   150 days/yeur   150 days/yeur   150 days/yeur   150 days/yeur   150 days/yeur   150 days/yeur   150 days/yeur   150 days/yeur   150 days/yeur   150 days/yeur   150 days/yeur   150 days/yeur   150 days/yeur   150 days/yeur   150 days/yeur   150 days/yeur   150 days/yeur   150 days/yeur   150 days/yeur   150 days/yeur   150 days/yeur   150 days/yeur   150 days/yeur   150 days/yeur   150 days/yeur   150 days/yeur   150 days/yeur   150 days/yeur   150 days/yeur   150 days/yeur   150 days/yeur   150 days/yeur   150 days/yeur   150 days/yeur   150 days/yeur   150 days/yeur   150 days/yeur   150 days/yeur   150 days/yeur   150 days/yeur   150 days/yeur   150 days/yeur   150 days/yeur   150 days/yeur   150 days/yeur   150 days/yeur   150 days/yeur   150 days/yeur   150 days/yeur   150 days/yeur   150 days/yeur   150 days/yeur   150 days/yeur   150 days/yeur   150 days/yeur   150 days/yeur   150 days/yeur   150 days/yeur   150 days/yeur   150 days/yeur   150 days/yeur   150 days/yeur   150 days/yeur   150 days/yeur   150 days/yeur   150 days/yeur   150 days/yeur   150 days/yeur   150 days/yeur   150 days/yeur   150 days/yeur   150 days/yeur   150 days/yeur   150 days/yeur   150 days/yeur   150 days/yeur   150 days/yeur   150 days/yeur   150 days/yeur   150 days/yeur   150 days/yeur   150 days/yeur   150 days/yeur   150 days/yeur   150 days/yeur   150 days/yeur   150 days/yeur   150 days/yeur   150 days/yeur   150 days/yeur   150 days/yeur   150 days/yeur   150 days/yeur   150 days/yeur   150 days/yeur   150 days/yeur   150 days/yeur   150 days/yeur   150 days/yeur   150 days/yeur   150 days/yeur   150 days/yeur   150 days/yeur   150 days/yeur   150 days/yeur   150 days/yeur   150 days/yeur   150 days/yeur   150 days/yeur   150 days/yeur   150 days/yeur   150 days/yeur   150 days/yeur   150 days/yeur   150 days/yeur   150 days/yeur   150 days/yeur   150 days/yeur   150 days/yeur   150 days/yeur   150 days/yeur   150 days/yeur   150 days/yeur	kg/mg kg INTAKE-INGESTION = days/yeur years That A K E - DIFRMA I =
BW   70    kg   INTAKE-INGESTION	kg INTAKE-INGESTION = days/year years intake-infrmal =
ENCY         EP         150         days/year           ION         ED         25         years           CANCER         AT         70         years           NONCANCER         AT         25         years           1ON         AE         Chemical-specific         unitless           exts. AT = ED         Chemical-specific         unitless           exts. AT = ED         Superfund Volume I:           nh Manual Supplemental Guidance Dermal Risk Assessment, 1998.	days/year years intakr.nFRMAI ==
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CANCER AT 70  NONCANCER AT 25  10N  AE Chemical-specific cits: AT = ED  ccts: AT = ED  refficiency is from the Risk Assessment Guidance for Superfund Volume I: nn Manual Supplemental Guidance Dermal Risk Assessment, 1998.	
AL ABSORPTION  AE  Chemical-specific  TENCY  neurcinogenic effects: AT = ED  mal absorption efficiency is from the Risk Assessment Guidance for Superfund Volume I: Health Evaluation Manual Supplemental Outdance Dermal Risk Assessment, 1998.	
AL ABSORPTION  AE  Chemical-specific  TENCY  neurcinogenic effects: AT = ED  mal absorption efficiency is from the Risk Assessment Guidance for Superfund Volume I:  Health Evaluation Manual Supplemental Outdance Dermal Risk Assessment, 1998.	
BFFICTENCY  Notes:  For noncarcinogenic effects: AT = ED  The dermal absorption efficiency is from the Risk Assessment Guidance for Superfund Volume I:  Human Health Evaluation Manual Supplemental Guidance Dermal Risk Assessment, 1998.	unitiess
Notes:  For noncarcinogenic effects: AT = ED  The dermal absorption effects is from the Risk Assessment Guidance for Superfund Volume I:  Human Health Evaluation Manual Supplemental Guidance Dermal Risk Assessment, 1998.	
For noncarcinogenic effects: AT = ED  The dermal absorption effectery is from the Risk Assessment Guidance for Superfund Volume I:  Human Health Evaluation Manual Supplemental Guidance Dermal Risk Assessment, 1998.	
The dermal absorption efficiency is from the Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual Supplemental Guidance Dermal Risk Assessment, 1998.	
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*The lesser of the 95 % upper confidence firmt (UCL) & maximum concentration.	
ND = Value not determined	

CWIW-SS3I INCIDENTAL INGESTION OF AND DERMAL CONTACT WITH SURFACE SOIL - RME FUTURE COMMERCIAL/INDUSTRIAL WORKER AOC 57 AREA 3 INDUSTRIAL FORT DEVENS, MA

#### CARCINOGENIC EFFECTS

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QNDOWGO	SOIL CONCENTRATEON (mg/kg)	INTAKE INGESTION (mg/kg-dey)	DERMAL ABSORPTION RFRICENCY	INTAKE DERMAL (mg/kg-day)	REFERENCE DOSE ORAL DERN (mg/kg-(44y) (mg/kg	E DOSE DERMA! (mg/kg:dry)	HAZARD QUOTIENT INGESITON	BAZARD QUOTIENT DERMAL	TOTAL HAZARD QUOTTENT	PERCENT TOTAL RISK
Arsenic	41	2.4E-05	0.03	1.5E-06	3.0E-04	2.9E-04	8.0E-02	5.1E-03	8.5E-02	94.51%
Iron	8040	4.7E-03	Q ₂		QN	Ω Q				-
Manganese	548	3.2E-04	QN		7.1E-02	ΩN	4.5E-03		4.5E-03	2.02%
VPH	.91	9.4E-06	0.17	3.3E-06	6.0E-01	5.5E-01	1.6E-05	5.9E-06	2.2E-05	0.02%
C9-C10 Aromatics	4.85	2.8E-06	0.17	9.9E-07	3.0E-02	2.7E-02	9.5E-05	3.7E-05	1.3E-04	0.15%
EPH On Cite Alichetics	191	2 1E-06	0.17	7.4E-07	6.0E-01	5.5E-01	3.6E-06	1.3E-06	4.9E-06	0.01%
Cy-C18 Auphatics	38	2.2E-05	0.17	•		5.5E+00	3.7E-06	1.4E-06	5.1E-06	0.01%
C11-C22 Aronatics	10	5.7E-06	0.17	2.0E-06	3.0E-02	2.7E-02	1.9E-04	7.3E-05	2.6E-04	0.29%
				SUMMARS	SUMMARY HAZARD INDEX	X	60.0	500'0	60'0	
							***************************************			



CWIW-SS31 INHALATION EXPOSURE TO PARTICULATES IN SURFACE SOIL - RME FUTURE COMMERCIAL/INDUSTRIAL WORKER AOC 57 AREA 3 INDUSTRIAL FORT DEVENS, MA

#### EXPOSURE PARAMETERS

als of potential concern.	EXPOSURE PURATION	years	AIR CONCENTRATION VOLATILES = CS x 1/VF  (VF not calculated because there are no VOCs selected as CPCs).
	Notes: * Soil concentration used to the base of the properties of potential concern.  **Volatilization factor used only for volatile chemicals of potential concern.	-	

CWIW-SS31
INHALATION EXPOSURE TO PARTICULATES IN SURFACE SOIL - RME
FUTURE COMMERCIAL/INDUSTRIAL WORKER
AOC 57 AREA 3 INDUSTRIAL
FORT DEVENS, MA

#### CARCINOGENIC EFFECTS

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4,2E-07       3,1E-08       1,4E-05       2,2E-03         1,2E-08       9,1E-10       5,7E-01       1,6E-09         3,7E-09       2,8E-10       1,7E-02       1,6E-08         2,9E-08       2,1E-10       5,7E-01       3,6E-10         2,9E-08       2,2E-09       ND       3,6E-10         7,4E-09       5,6E-10       2,0E-02       2,8E-08
1.2E-08       9.1E-10       5.7E-01       1.6E-09         3.7E-09       2.8E-10       1.7E-02       1.6E-08         2.8E-09       2.1E-10       5.7E-01       3.6E-10         2.9E-08       2.2E-09       ND       3.6E-10         7.4E-09       5.6E-10       2.0E-02       2.8E-08
3.7E-09       2.8E-10       1.7E-02       1.6E-08         2.8E-09       2.1E-10       5.7E-01       3.6E-10         2.9E-08       2.2E-09       ND       ND         7.4E-09       5.6E-10       2.0E-02       2.8E-08
2.9E-09 2.1E-10 5.7E-01 3.6E-10 2.9E-08 7.4E-09 5.6E-10 2.0E-02 2.8E-08
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CWTW-SS3(CT)
INCIDENTAL INGESTION OF AND DERMAL CONTACT WITH SURFACE SOIL - CENTRAL TENDENCY
FUTURE COMMERCIAL/INDUSTRIAL WORKER
AOC 57 AREA 3 INDUSTRIAL
FORT DEVENS, MA

14-Mar-00

#### EXPOSURE PARAMETERS

PARAMETER	TORWAS	VALUE	UNITS		
CONCENTRATION SOIL	S	See Below*	mg/kg	CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR (mg/kg-day)-1	SLOPE FACTOR (mg/kg-day)-1
INGESTION RATE	떰	20	mg/day		
FRACTION INGESTED	E	100%		HAZARD QUOTENT = INTAKE (mg/kg-day) / REFERENCE DOSE (mg/kg-day)	FERENCE DOSE (mg/kg-day)
SOIL ADHERENCE FACTOR	SAF	0.016	mg/cm²		
SURFACE AREA EXPOSED	SA	12,731	cm³	INTAKE = (INTAKE-INGESTION) + (INTAKE-DERMAL)	RMAL)
CONVERSION FACTOR	రీ	0.000001	kg/mg		
BODY WEIGHT	BW	70	g	INTAKE-INGESTION = CS x IR x FI x CF x EF x ED	X EF X ED
EXPOSURE FREQUENCY	ם	150	days/year	BW x AT x 365 days/yr	days/yr
EXPOSURE DURATION	ED	9.9	years		
AVERAGING TIME				INTAKE-DERMAL = CS x SA x SAF x AE x CF x EF x ED	CF x EF x ED
CANCER	AT	70	years	BW x AT x 365 days/yr	days/yr
NONCANCER	AT	9.9	years		
DERMAL ABSORPTION	AE	Chemical-specific	unitless		
EFFICIENCY					
Notes:					
For noncarcinogenic effects: AT = ED					
The dermal absorption efficiency is from the Risk Assessment Guidance for Superfund Volume I:	Risk Assessment Guidance	for Superfund Volume I:			
Human Health Evaluation Manual Supplemental Guidance Dermal Risk Assessment, 1998.	ntal Guidance Dermal Risk	Assessment, 1998.			
*The lesser of the 95 % upper confidence limit (UCL) & maximum concentration.  ND = Value and determined.	it (UCL) & maximum cond	centration.			
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CWIW-SS3(CT)
INCIDENTAL INGESTION OF AND DERMAL CONTACT WITH SURFACE SOIL - CENTRAL TENDENCY
FUTURE COMMERCIAL/INDUSTRIAL WORKER
AOC 57 AREA 3 INDUSTRIAL
FORT DEVENS, MA

#### CARCINOGENIC EFFECTS

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COMPOUND	SOIL CONCENTRATION (mg/kg)	INTAKE INGESTION (mp/kg-day)	DERMAL ABSORPTION EFFICENCY	INTAKE DERMAL (mg/kg-dsy)	DRAL DERM (mg/kg-day) (mg/kg-	CE DOSE DERNEAL (mg/kg-day)	HAZARD QUOTIENT INGESTION	BAZARD QUOTIENT DERMAL	TOTAL HAZARD QUOTTENT	PERCENT TOTAL RISK
Arsenic	41	1.2E-05	0.03	1.5E-06	3.0E-04	2.9E-04	4.0E-02	5.1E-03	4.5E-02	94.68%
Iron	8040	2.4E-03	QN		QN	QN				
Manganese	548	1.6E-04	QN		7.1E-02	ΩN	2.3E-03		2.3E-03	4.75%
VPH										
C9-C12 Aliphatics	91	4.7E-06	0.17	3.3E-06	6.0E-01	5.5E-01	7.8E-06	5.9E-06	1.4E-05	0.03%
C9-C10 Aromatics	4.85	1.4E-06	0.17	9.9E-07	3.0E-02	2.7E-02	4.7E-05	3.7E-05	8.4E-05	0.18%
ЕРН										
C9-C18 Aliphatics	3,63	1.1E-06	0.17	7.4E-07	6.0E-01	5.5E-01	1.8E-06	1.3E-06	3.1E-06	0.01%
C19-C36 Aliphatics	38	1.1E-05	0.17	7.7E-06	6.0E+00	5.5E+00	1.9E-06	1.4E-06	3.3E-06	0.01%
C11-C22 Aromatics	01	2.9E-06	0.17	2.0E-06	3.0E-02	2.7E-02	9.5E-05	7.3E-05	1.7E-04	0.35%
				SUMMARY	SUMMARY HAZARD INDEX	×	6.04	6.005	0.05	

CWIW-SSSI(CT)
INHALATION EXPOSURE TO PARTICULATES IN SURFACE SOIL - CENTRAL TENDENCY
FUTURE COMMERCIAL/INDUSTRIAL WORKER
AOC 57 AREA 3 INDUSTRIAL
FORT DEVENS, MA

EQUATIONS

EXPOSURE PARAMETERS

CONCENTRATION SOLL*  CONCENTRATION SOLL*  CONCENTRATION AIR PARTICULATES  CONCENTRATION AIR VOLATILES  CONCENTRATION AIR VOLATILES  CONCENTRATION RACTOR**  INHALATION RATE  BODY WEIGHT  EXPOSURE TIME  EXPOSURE TIME  EXPOSURE FREQUENCY  EXPOSURE FREQUENCY  EXPOSURE FREQUENCY  EXPOSURE FREQUENCY  EXPOSURE FREQUENCY  EXPOSURE FREQUENCY  EXPOSURE FREQUENCY  EXPOSURE FREQUENCY  EXPOSURE TIME  EXPOSURE DURATION  RAF  AVERAGING TIME  CANCER  AT  NOONCANCER  AT  NOONCANCER  AT  NOONCANCER  AT  NOONCANCER  AT  NOONCANCER  AT  NOONCANCER  AT  NOONCANCER  AT  NOONCANCER  AT  NOONCANCER  AT  NOONCANCER  AT  NOONCANCER  AT  NOONCANCER  AT  NOONCANCER  AT  NOONCANCER  AT  NOONCANCER  AT  NOONCANCER  AT  NOONCANCER  AT  NOONCANCER  AT  NOONCANCER  AT  NOONCANCER  AT  NOONCANCER  AT  NOONCANCER  AT  NOONCANCER  AT  NOONCANCER  AT  NOONCANCER  AT  NOONCANCER  AT  NOONCANCER  AT  NOONCANCER  AT  NOONCANCER  AT  NOONCANCER  AT  NOONCANCER  AT  NOONCANCER  AT  NOONCANCER  AT  NOONCANCER  AT  NOONCANCER  AT  NOONCANCER  AT  NOONCANCER  AT  NOONCANCER  AT  NOONCANCER  AT  NOONCANCER  AT  NOONCANCER  AT  NOONCANCER  AT  NOONCANCER  AT  NOONCANCER  AT  NOONCANCER  AT  NOONCANCER  AT  NOONCANCER  AT  NOONCANCER  AT  NOONCANCER  AT  NOONCANCER  AT  NOONCANCER  AT  NOONCANCER  AT  NOONCANCER  AT  NOONCANCER  AT  NOONCANCER  AT  NOONCANCER  AT  NOONCANCER  AT  NOONCANCER  AT  NOONCANCER  AT  NOONCANCER  AT  NOONCANCER  AT  NOONCANCER  AT  NOONCANCER  AT  NOONCANCER  AT  NOONCANCER  AT  NOONCANCER  AT  NOONCANCER  AT  NOONCANCER  AT  NOONCANCER  AT  NOONCANCER  AT  NOONCANCER  AT  NOONCANCER  AT  NOONCANCER  AT  NOONCANCER  AT  NOONCANCER  AT  NOONCANCER  AT  NOONCANCER  AT  NOONCANCER  AT  NOONCANCER  AT  NOONCANCER  AT  NOONCANCER  AT  NOONCANCER  AT  NOONCANCER  AT  NOONCANCER  AT  NOONCANCER  AT  NOONCANCER  AT  NOONCANCER  AT  NOONCANCER  AT  NOONCANCER  AT  NOONCANCER  AT  NOONCANCER  AT  NOONCANCER  AT  NOONCANCER  AT  NOONCANCER  AT  NOONCANCER  AT  NOONCANCER  AT  NOONCANCER  AT  NOONCANCER  AT  NOONCANCER  AT  NOONCANCER  AT  NOO	See below Calculated Calculated Calculated 1.32E+09 1.6 70 8 8 1.50 70 70 70 6.6 100%	mg/m² mg/m² mg/m² mg/m² m²/kg ug/m² m²/hour kg hours/day days/year years years	CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR (mg/kg-day)-1 HAZARD QUOTIENT = INTAKE (mg/kg-day) / REFERENCE CONCENTRATION (mg/kg-day) INTAKE - INHALATION = (CAp + Cav) x RAF x lir x ET x EF x ED  BW x AT x 365 days/yr  AIR CONCENTRATION PARTICULATES = CS x 1/PEF  AIR CONCENTRATION VOLATILES = CS x 1/VF  (VF not calculated because there are no VOCs selected as CPCs).
For noncarcinogenic effects: AT = ED  ND = Value not determined			

CWIW-SS3I(CT)
INHALATION EXPOSURE TO PARTICULATES IN SURFACE SOIL - CENTRAL TENDENCY
FUTURE COMMERCIAL/INDUSTRIAL WORKER
AOC 57 AREA 3 INDUSTRIAL
FORT DEVENS, MA

#### CARCINOGENIC EFFECTS

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cse         41         NA         3.1E-08         2.3E-09         ND           Rod         NA         6.1E-06         4.6E-07         ND         ND           Aliphatics         Aromatics         Actionalities         NA         1.2E-08         9.1E-10         5.7E-01         1.6E-09         0.0           Aliphatics         NA         1.2E-08         9.1E-10         5.7E-01         1.6E-09         0.0           Aliphatics         NA         2.8E-09         2.1E-10         5.7E-01         3.6E-10         0.0           Admitties         NA         2.9E-09         2.2E-09         ND         ND         ND           Aromatics         NA         NA         7.4E-09         5.6E-10         2.0E-02         2.8E-09         0.0	cse         41         NA         3.1E-08         2.3E-09         ND           Red-or state         NA         6.1E-06         4.6E-07         ND         ND           Aliphatics         Aromatics         1.2E-08         9.1E-10         5.7E-01         1.6E-09           Aliphatics         Aliphatics         NA         2.8E-09         2.1E-10         5.7E-01         1.6E-09           Aliphatics         NA         NA         2.2E-09         2.1E-10         5.7E-01         3.6E-10           Aliphatics         NA         NA         2.2E-09         ND         ND         ND           Aromatics         NA         NA         2.2E-09         3.6E-10         2.0E-02         2.8E-08	COMPOUND	SOR. CONCENTRATION (mg/kg)	V.R (π?/kg)	AIR CONCENTRATION VOLATILES PARTIC (mg/m²) (a)g	ULATES (m²)	INTAKE (mg/kg·day)	REFERENCE DOSE (mg/kg-day)	HAZARD	TOTAL
see         8040         NA         6.1E-06         4.6E-07         ND         ND           Aliphatics         16         NA         NA         1.2E-08         9.1E-10         5.7E-01         1.6E-09           Aromatics         3.6 Aliphatics         3.6 -10         NA         2.8E-09         2.1E-09         3.7E-01         1.6E-09           Aromatics         3.6 Aliphatics         NA         2.2E-09         2.2E-09         ND         ND           Aromatics         10         NA         7.4E-09         5.6E-10         2.0E-08         2.0E-08	cse         8040         NA         6.1E-06         4.6E-07         ND         ND           Aliphatics         548         NA         4.2E-07         3.1E-08         1.4E-05         2.2E-03           Aromatics         4.85         NA         1.2E-08         9.1E-10         5.7E-01         1.6E-09           Aliphatics         3.6         NA         2.8E-09         2.1E-10         5.7E-01         3.6E-10           Aliphatics         38         NA         NA         2.2E-09         ND         ND           A Aromatics         10         NA         7.4E-09         5.6E-10         2.0E-02         2.8E-08	rsenic	41			3.1E-08	2.3E-09	ΩN		
Aliphatics Aromatics	cse         548         NA         4.2E-07         3.1E-08         1.4E-05         2.2E-03           Aliphatics         Aromatics         Aniphatics         NA         1.2E-08         9.1E-10         5.7E-01         1.6E-09           Aliphatics         Aniphatics         NA         2.8E-09         2.1E-10         5.7E-01         3.6E-10           Aniphatics         NA         NA         2.2E-09         ND         ND         ND           Aromatics         NA         NA         7.4E-09         5.6E-10         2.0E-02         2.8E-08		8040			90-B1.9	4.6E-07	Q		
Atomatics Aromatics 16 NA 1.2E-08 9.1E-10 5.7E-01 1.6E-09 1.6E-09 3.6E-10 1.7E-02 1.6E-09 1.6E-09 2.8E-10 1.7E-02 1.6E-09 2.8E-10 1.7E-02 1.6E-08 1.7E-02 1.6E-08 2.2E-09 2.1E-10 5.7E-01 3.6E-10 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E-09 1.6E	Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromat	fanganese	548			4.2E-07	3.1E-08	1.4E-05	2.2E-03	100.00%
Aniphatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aroma	Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromatics Aromat	Hd	7			1.2E-08	9.1E-10	5.7E-01	1.6E-09	
Aliphatics 3.6 NA 2.8E-09 2.1E-10 5.7E-01 3.6E-10 3.6F-10	Aliphatics 3.6 NA 2.8E-09 2.1E-10 5.7E-01 3.6E-10 3.6E-10 5.7E-01 3.6E-10 3.6E-10	9-C10 Aromatics	4.85			3.7E-09	2.8E-10	1.7E-02	1.6E-08	
38 NA 2.9E-08 2.2E-09 ND 10 NA 7.4E-09 5.6E-10 2.0E-08	38 NA 2.9E-08 2.2E-09 ND 7.4E-09 5.6E-10 2.0E-02 2.8E-08	Ha	•			3 8 12.00	7 18-10	5 7F-01	3 6F-10	
10 NA 7.4E-09 5.6E-10 2.0E-02 2.8E-08	10 NA 7.4E-09 5.6E-10 2.0E-02 2.8E-08	9-C18 Aliphatics	5.0 3.8			2.9E-08	2.2E-09	QZ QZ		
		11-C22 Aromatics	2	Ϋ́Z		7.4E-09	5.6E-10	2.0E-02	2.8E-08	0.000012

CWIW-GW21 INGESTION OF GROUNDWATER AS DRINKING WATER (UNFILTERED SAMPLES) - RME CURRENT/FUTURE LAND USE - COMMERCIAL/INDUSTRIAL WORKER AOC 57 AREA 3 INDUSTRIAL FORT DEVENS, MA

#### EXPOSURE PARAMETERS

****	CANCER RISK - INTAKE (ng/kg-day) x CANCER SLOPE FACTOR (mg/kg-day)-1		HAZARD QUOITIENT = INTAKE (mg/kg-day) / REFERENCE DOSE (mg/kg-day)			INTAKE = CWAIRAEFAEDACF	BW x AT x 365 days/year				
UNITS	1	liters/day	ķ	gu/gm	days/year	years		years	years	,	
VALUE	chemical-specific	-	20	0.001	250	25		70	25		
SYMBOL	CW	쮼	BW	ర	#3	Œ		AT	AT		
PARAMETER	CONCENTRATION WATER	INCESTION RATE	BODY WEIGHT	CONVERSION FACTOR	EXPOSURE FREQUENCY	EXPOSURE DURATION	AVERAGING TIME	CANCER	NONCANCER	Notes:	For noncarcinogenic effects: AT = ED

CWIW-GW21
INGESTION OF GROUNDWATER AS DRINKING WATER (UNFILTERED SAMPLES) - RME
CURRENT/FUTURE LAND USE - COMMERCIAL/INDUSTRIAL WORKER
AOC 57 AREA 3 INDUSTRIAL
FORT DEVENS, MA

#### CARCINOGENIC EFFECTS

				CONTRACT OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF TH	
Arsenic	33.2 lug/Liter	y/Liter	1.2E-04	1.5E+00	1.7E-04
Cadmium	8.67 ug/Liter	g/Liter	3.0E-05	ΩZ	
,4-Dichlorobenzene	5.6 u	5.6 ug/Liter	2.0E-05	2.4E-02	4.7E-07
Naphthalene	20	y/Liter	7.0E-05	ND	
Carbon Tetrachloride	4.5 [0]	VLiter	1.6E-05	1.36-01	2.0E-06
Chlorofoem	10 E	10 ug/Liter	3.5E-05	6.1E-03	2.1E-07
etrachioroethene	2.6 प	2.6 ug/Liter	9.1E-06	5.2E-02	4.7E-07

Aluminam	061	190 ug/Liter	1.9E-03	1.0E+00	1.9E-03
Arsenic	33.2	33.2 ug/Liter	3.2E-04	3.06-04	1.1E+00
Cadmium	8.67	8.67 ug/Liter	8.5E-05	5.06-04	1.7E-01
Iron	12400	12400 ug/Liter	1.2E-01	QN	
Manganese	466	466 ug/Liter	4.6E-03	2,4E-02	1.9E-01
1.2-Dichlorobenzene	8.6	9.8 ug/Liter	9.6E-05	9.0E-02	1.1E-03
1,4-Dichlorobeuzene	5.6	5.6 ug/Liter	5.5E-05	3.0E-02	1.8E-03
Naphthalene	20	20 ug/Liter	2.0E-04	2.0E-02	9.8E-03
Carbon Tetrachloride	4.5	4.5 ug/Liter	4.4E-05	7.06-04	6.3E-02
Chloreform	92	10 ug/Liter	9.8E-05	1.0E-02	9.8E-03
Tetrachloroethene	2.6	2.6 ug/Liter	2.5E-05	1.0E-02	2.5E-03
C9-C10 Aromatics	310	310 ug/Liter	3.0E-03	3.0E-02	1.0E-01

CWIW-GW2I(CT)

INCESTION OF GROUNDWATER AS DRINKING WATER (UNFILTERED SAMPLES) - CENTRAL TENDENCY CURRENT/FUTURE LAND USE - COMMERCIAL/INDUSTRIAL WORKER AOC 57 AREA 3 INDUSTRIAL FORT DEVENS, MA

#### EXPOSURE PARAMETERS

	SYMBOL	VALUE	SI SINITS	
CONCENTRATION WATER	CW	chemical-specific		CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR (mg/kg-day)-1
INGESTION RATE	ĸ	_	liters/day	
BODY WEIGHT	BW	02	kg	HAZARD QUOITIENT = INTAKE (mg/kg-day) / REFERENCE DOSE (mg/kg-day)
CONVERSION FACTOR	þ	0.001	mg/ug	
EXPOSURE FREQUENCY	EP.	250	days/year	
EXPOSURE DURATION	ED	9.9	years	$INTAKE = CW_X IR_X EF_X ED_X CF$
AVERAGING TIME				BW x AT x 365 days/year
CANCER	AT	70	years	
NONCANCER	AT	9.9	years	
Notes: For noncarcinogenic effects: AT = ED				

3/14/004:15 PM

CWIW-GW2I(CT)
INGESTION OF GROUNDWATER AS DRINKING WATER (UNFILTERED SAMPLES) - CENTRAL TENDENCY
CURRENT/FUTURE LAND USE - COMMERCIAL/INDUSTRIAL WORKER
AOC 57 AREA 3 INDUSTRIAL
FORT DEVENS, MA

#### CARCINOGENIC EFFECTS

Arsenic         Arsenic         1.5E+00         1.5E+00         4.6E-05           Cadmium         8.67 lug/Lier         8.0E-06         2.4E-02         1.2E-07           1.4-Dichlorobeuzne         5. ug/Lier         5.2E-06         2.4E-02         1.2E-07           Naphthalene         4. ug/Lier         4.2E-06         1.3E-01         5.4E-07           Carbon Terrachloride         4. ug/Lier         9.2E-06         6.1E-03         5.6E-08           Leinzhloroentene         2. ug/Lier         2.4E-06         6.1E-03         5.2E-07	Arsenic			The second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second secon	INGESTION
oberazare         8.67 lag/Liter         lag/Liter         8.08-06         AD           ne         2.0 lag/Liter         3.2E-06         2.4E-02           rraction/de         4.2E-06         1.3E-01           ne         1.0 lag/Liter         2.2E-06         6.1E-03           action         2.2E-05         6.1E-03		33.2 ug/Liter	3.1E-05	1.5E+00	4.6E-05
obetazene         5.0 lag/Liter         5.2E-06         2.4E-02           netrachloride         4.5 lag/Liter         4.2E-06         1.3E-01           n         10 lag/Liter         9.2E-06         6.1E-03           nethene         2.6 lag/Liter         2.4E-06         5.2E-02		8.67 ug/Liter	8.0E-06	GN	
20 ug/Lier 1.8E-05 ND 4.5 ug/Lier 4.2E-06 1.3E-01 10 ug/Lier 9.2E-06 6.1E-03 2.6 ug/Lier 2.4E-06 5.2E-02	,4-Dichlorobenzene	5.6 lug/Liter	5.2E-06	2.4E-02	1.26-07
thloride         4.5 ug/Lier         4.2 E-06         1.3 E-01           10 ug/Lier         9.2 E-06         6.1 E-03           2.6 ug/Lier         2.4 E-06         5.2 E-02	daphthalene	20 ug/Liter	1.8E-05	QN	
10 lug/Liter 9.2E-06 6.1E-03 2.6 lug/Liter 2.4E-06 5.2E-02	arbon Tetrachloride	4.5 ug/Liter	4.2E-06	1.3E-01	5.4E-07
2.6 tg/Liter 2.4E-06 5.2E-02	hiarofoem	10 lug/Liter	9.2E-06	6.1E-03	5.6E-08
	etrachloroethene	2.6 ug/Liter	2.4E-06	5.2E-02	1.2E-07

Aluminum	061	190 ug/Liter	1.9E-03	1.0E+00	1.9E-03
Arsenic	33.2	33.2 ug/Liter	3.2E-04	3.06-04	1.1E+00
Cadmium	8.67	8.67 ug/Liter	8.5E-05	5.0E-04	1.7E-01
Iron	12400	12400 ug/Liter	1.2E-01	QX	
Manganese	466	466 ug/Liter	4.6E-03	2.4E-02	10-961
1,2-Dichlorobenzene	8.6	9.8 ug/Liter	9.6E-05	9.0E-02	1.16-03
,4-Dichlorobenzene	5.6	5.6 ug/Liter	5.5E-05	3.06-02	1.8E-03
Naphthalene	20	20 ug/Liter	2.0E-04	2.08-02	9.8E-03
Carbon Tetrachloride	4.5	4.5 ug/Liter	4.4E-05	7.08-04	6.3E-02
Chloroform	01	10 ug/Liter	9.8E-05	1.08-02	9.8E-03
Tetrachloroethene	2.6	2.6 ug/Liter	2.5E-05	1.0E-02	2.5E-03
C9-C10 Aromatics	310	310 ug/Liter	3.0E-03	3.0E-02	1.0E-01

INCIDENTAL INGESTION OF AND DERMAL CONTACT WITH SURFACE SOIL - RME FUTURE CONSTRUCTION WORKER
AOC 57 AREA 3 INDUSTRIAL
FORT DEVENS, MA "

03-Feb-00

**EXPOSURE PARAMETERS** 

PARAMETER	SYMBOL	VALUE	2	
CONCENTRATION SOIL	S	See Below*	mg/kg	CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR (mg/kg-day)-1
INGESTION RATE	Ħ	480	mg/day	-
FRACTION INGESTED	E	100%		HAZARD QUOTIENT =: INTAKE (mg/kg-day) / REFERENCE DOSE (mg/kg-day)
SOIL ADHERENCE FACTOR	SAF	0.28	mg/cm²	
SURFACE AREA	SA	5200	cm2	
CONVERSION FACTOR	ť	0.000001	kg/mg	INTAKE = (INTAKE-INGESTION) + (INTAKE-DERMAL)
BODY WEIGHT	BW	92	kg	
EXPOSURE FREQUENCY	HH	250	days/year	INTAKE-INGESTION = CS x IR x F( x CF x EF x ED
EXPOSURE DURATION	Œ	0.5	years	BW x AT x 365 days/yr
AVERAGING TIME				
CANCER	AT	20	years	INTAKE-DERMAL = $\frac{CS \times SA \times SAF \times AE \times CF \times EF \times ED}{}$
NONCANCER	AT	0.5	years	BW x AT x 365 days/yr
DERMAL ABSORPTION	AE	Chemical-specific	unitless	
EFFICIENCY				
Notes:				
For noncarcinogenic effects: AT = ED				
The dermal absorption efficiency is from the Risk Assessment Guidance for Superfund Volume I:	sk Assessment Guidance	for Superfund Volume I:		
Human Health Evaluation Manual Supplemental Guidance Dermal Risk Assessment, 1998.	al Guidance Dermal Risk	Assessment, 1998.		
*The lesser of the 95 % upper confidence limit (UCL) & maximum concentration.	(UCL) & maximum cond	entration.		
ND = Value not determined				

CON-SS3I
INCIDENTAL INGESTION OF AND DERMAL CONTACT WITH SURFACE SOIL - RME
PUTURE CONSTRUCTION WORKER
AOC 57 AREA 3 INDUSTRIAL
FORT DEVENS, MA

#### CARCINOGENIC EFFECTS

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ONDO#WOD	SOIL CONCENTRATION (mg/kg)	INTAKE INGESTION (mg/kg-day)	DERMAL AESORPTION RFFICERICY	INTAKE DERMAL (mg/kg-day)	REFERENCE DOSE ORAL DERN (WEKE-(4a)) (MENG	CE DOSE DERMAL (mg/kg-day)	HAZARD QEOTIENT INGESTION	BAZARD QUOTIENT DERMAL	TOTAL HAZARD QUOTIENT	PERCENT TOTAL RISK
Arsenic	41	1.9E-04	0.03	1.8E-05	3.0E-04	2.9E-04	6.4E-01	6.0E-02	7.0E-01	95.04%
Iron	8040	3.8E-02	QN	0.0E+00	QN.	QN				
Manganese	548	2.6E-03	ΩN	0.0E+00	7.1E-02	4.30E-03	3.6E-02	0.0E+00	3.6E-02	4.91%
VPH										
C9-C12 Aliphatics	91	7.5E-05	0.17	3.9E-05	6.0E+00	5.5E+00	1.3E-05	7.0E-06	2.0E-05	0.003%
C9-C10 Aromatics	4.85	2.3E-05	0.17	1.2E-05	3.0E-01	2.7E-01	7.6E-05	4.4E-05	1.2E-04	0.02%
ЕРН										
C9-C18 Aliphatics	3.6	1.7E-05	0.17	8.8E-06	6.0E+00	5.5E+00	2.8E-06	1.6E-06	4.4E-06	0.001%
C19-C36 Aliphatics	38	1.8E-04	0.17	9.2E-05	6.0E+01	5.5E+01	3.0E-06	1.7E-06	4.6E-06	0.001%
C11-C22 Aromatics	01	4.6E-05	0.17	2.4E-05	3.0E-01	2.7E-01	1.5E-04	8.7E-05	2.4E-04	0.03%
				SUMMARY	SUMMARY HAZARD INDEX	X	2:0	90.00	2:0:2	

CON-SSJ INHALATION EXPOSURE TO PARTICULATES IN SURFACE SOIL - RME FUTURE CONSTRUCTION WORKER AOC 57 AREA 3 INDUSTRIAL FORT DEVENS, MA

#### EXPOSURE PARAMETERS

	CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR (mg/kg-day)-1		HAZARD QUOTIENT = INTAKE (mg/kg-day) / REFERENCE CONCENTRATION (mg/kg-day)			INTAKE - INHALATION = (CAp + Cay) x RAF x IhR x ET x EF x ED	BW x AT x 365 days/yr			AIR CONCENTRATION PARTICULATES = CS x 1/PEF		AIR CONCENTRATION VOLATILES = CS x I/VF	(VF not calculated because there are no VOCs selected as CPCs).					
UNITS	mg/kg	mg/m³	mg/m³	m³/kg	ug/m³	m³/hour	kg	hours/day	days/year	years			years	years				
VALUE	See below	Calculated	Calculated	Calculated	1.32E+09	3.3	70	80	250	0.5	%001		70	0.50	naximum concentration			
SYMBOL	S	CAp	CAv	VF	PEF	IIR	BW	ы	FF 5	æ	RAF		ΑT	AT	confidence limit (UCL) & r	d concern.		
PARAMETER	CONCENTRATION SOIL*	CONCENTRATION AIR PARTICULATES	CONCENTRATION AIR VOLATILES	VOLATILIZATION FACTOR**	PARTICULATE EMISSIONS FACTOR	INHALATION RATE	BODY WEIGHT	EXPOSURE TIME	EXPOSURE FREQUENCY	EXPOSURE DURATION	RELATIVE ABSORPTION FACTOR	AVERAGING TIME	CANCER	NONCANCER	Notes: * Soil concentration used is the lesser of the 95 % upper confidence limit (UCL) & maximum concentration	**Volatilization factor used only for volatile chemicals of potential concern.	For noncarcinogenic effects: AT = ED	ND = Value not determined

CON-SS31
INHALATION EXPOSURE TO PARTICULATES IN SURFACE SOIL - RME
FUTURE CONSTRUCTION WORKER
AOC 57 AREA 3 INDUSTRIAL
FORT DEVENS, MA

#### CARCINOGENIC EFFECTS

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CON-SB31
INCIDENTAL INGESTION OF AND DERMAL CONTACT WITH SUBSURFACE SOIL - RME
FUTURE CONSTRUCTION WORKER
AOC 57 AREA 3 INDUSTRIAL
FORT DEVENS, MA

14-Mar-00

#### EXPOSURE PARAMETERS

PARAMETER	SYMBOL	VALUE	CINITS		
CONCENTRATION SOIL	SS	See Below*	mg/kg	CANCER RISK = INTAKE	CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR (mg/kg-day)-1
INGESTION RATE	R	480	mg/day		
FRACTION INGESTED	F	100%		HAZARD QUOTIENT = II	HAZARD QUOTIENT = INTAKE (mg/kg-day) / REFERENCE DOSE (mg/kg-day)
SOIL ADHERENCE FACTOR	SAF	0.28	_		
SURFACE AREA	SA	5200	cm²		
CONVERSION FACTOR	ភ	0.000001	kg/mg	INTAKE = (INTAKE-ING	INTAKE = (INTAKE-INGESTION) + (INTAKE-DERMAL)
BODY WEIGHT	BW	07	kg		
EXPOSURE FREQUENCY	F.	250	_	INTAKE-INGESTION =	CS x IR x FI x CF x EF x ED
EXPOSURE DURATION	ED	0.5	years		BW x AT x 365 days/yr
AVERAGING TIME					
CANCER	AT	07	years	INTAKE-DERMAL =	CS x SA x SAF x AE x CF x EF x ED
NONCANCER	AT	0.5	years		BW x AT x 365 days/yr
DERMAL ABSORPTION	AE	Chemical-specific	unitless	-	
EFFICIENCY					
Notes:					
For noncarcinogenic effects: AT = ED					
The dermal absorption efficiency is from the Risk Assessment Guidance for Superfund Volume I:	tisk Assessment Guidance	for Superfund Volume I:			
Human Health Evaluation Manual Supplemental Guidance Dennal Risk Assessment, 1998.	tal Guidance Dermal Risk	Assessment, 1998.			
*The lesser of the 95 % upper confidence limit (UCL) & maximum concentration.	it (UCL) & naximum cond	centration.			
ND = Value not determined					

CON-SB31
INCIDENTAL INGESTION OF AND DERMAL CONTACT WITH SUBSURFACE SOIL - RME
FUTURE CONSTRUCTION WORKER
AOC 57 AREA 3 INDUSTRIAL
FORT DEVENS, MA

## CARCINOGENIC EFFECTS

PERCENT TOTAL RISK	100.00%	
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PERCENT TOTAL RISK	9	
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TOTAL CANCER RISK	5.	
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***************************************	Arsenic	

동국고	98.26%		,6100	<u>.</u>	0.01%	į	0.06%	0.07%	1.61%		1
PERCENT TOTAL RISK				_							
rotal Hazard Quottent	1.7E-01		70 10 -	1.05-00	8.6E-06	1	9.5E-05	1.2E-04	2.7E-03	0.2	
Hazard Quotient Dekmal	1.4E-02			3.7E-07	3.1E-06	,	3.4E-05	4.4E-05	9.9E-04	0,02	
HAZARD QUOTIENT INGESTION	1.5E-01		r,	0.02-07	5.5E-06		6.1E-05	7.7E-05	1.7E-03	0.2	
CE DOSE DERMAL (mg/kg-day)	2.9E-04	Q	1	5.55+00	2.7E-01		5.5E+00	5.5E+01	2.7E-01		
REFERENCE DOKE ORAL ORAL (mg/kg-(ay) (mg/kg	3.0E-04	QX	6	6,0E+00	3.0E-01		6.0E+00	6.0E+01	3.0E-01	SHWMARY HAZARD INDEX	
INTAKE DERMAL (mg/kg-dmy)	4.1E-06	0.0E+00		2.0E-06	8.5E-07		1.9E-04	2.4E-03	2.7E-04	STIMMAR	
DERMAL ABSORPTION EFFICTENCY	0.03	ND		0.17	0.17		0.17	0.17	0.17		
INTAKE INGESTION (mg/kg-day)	4.5E-05	3.0E-02		3.9E-06	1.6E-06		3.7E-04	4.6E-03	5.2E-04		
SOIL CONCENTRATION (mg/kg)	29.6	6410		0.84	0.35		78	066	110		
COMPOUND	Arsenic	Iron	VPH	C9-C12 Aliphatics	C9-C10 Aromatics	ЕРН	C9-C18 Aliphatics	C19-C36 Aliphatics	C11-C22 Aromatics		

CON-SB31
INHALATION EXPOSURE TO PARTICULATES IN SUBSURFACE SOIL - RME
FUTURE CONSTRUCTION WORKER
AOC 57 AREA 3 INDUSTRIAL
FORT DEVENS, MA

#### EXPOSURE PARAMETERS

	CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR (mg/kg-day)-1		HAZARD QUOTIENT = INTAKE (mg/kg-day) / REFERENCE CONCENTRATION (mg/kg-day)			INTAKE - INHALATION = $\frac{(CAD + Cav) \times RAF \times IhR \times ET \times EF \times ED}{A}$	BW x AT x 365 days/yr			TICULATES = CS x 1/PEF		ATILES = CS x I/VF	(VF not calculated because there are no VOCs selected as CPCs).					
	CANCER RISK = INTAKE (m		HAZARD QUOTIENT = INTA			INTAKE - INHALATION = IC	<b>8</b>			AIR CONCENTRATION PARTICULATES = CS x 1/PEF		AIR CONCENTRATION VOLATILES = CS x 1/VF	(VF not calculated because then	<del>-</del>				
UNITS	mg/kg	mg/m³	mg/m³	m³/kg	ug/m³	m³/hour	kg	hours/day	days/year	years			years	years	=			
VALUE	See below	Calculated	Calculated	Calculated	1.32E+09	3.3	07	DC	250	0.5	%001		70	0.50	& maximum concentration			
SYMBOL	cs	САр	CAv	VF	PEF	IhR	BW	ET	铝	<b>a</b>	RAF		AT	AT	confidence limit (UCL) &	ial concern.		
PARAMETER	CONCENTRATION SOIL*	CONCENTRATION AIR PARTICULATES	CONCENTRATION AIR VOLATILES	VOLATILIZATION FACTOR**	PARTICULATE EMISSIONS FACTOR	INHALATION RATE	BODY WEIGHT	EXPOSURE TIME	EXPOSURE FREQUENCY	EXPOSURE DURATION	RELATIVE ABSORPTION FACTOR	AVERAGING TIME	CANCER	NONCANCER	Notes: * Soil concentration used is the lesser of the 95 % upper confidence limit (UCL)	**Volatilization factor used only for volatile chemicals of potential concern.	For noncarcinogenic effects: AT = ED	ND = Value not determined

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CON-SB31
INHALATION EXPOSURE TO PARTICULATES IN SUBSURFACE SOIL - RME
FUTURE CONSTRUCTION WORKER
AOC 57 AREA 3 INDUSTRIAL
FORT DEVENS, MA

#### CARCINOGENIC EFFECTS

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CON-SS31(CT)
INCIDENTAL INGESTION OF AND DERMAL CONTACT WITH SURFACE SOIL - CENTRAL TENDENCY
FUTURE CONSTRUCTION WORKER
AOC 57 AREA 3 INDUSTRIAL
FORT DEVENS, MA

03-Feb-00

EXPOSURE PARAMETERS

PARAMETER	SYMBOL	VALUE	UNITS			
CONCENTRATION SOIL	S	See Below*	mg/kg	CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR (mg/kg-day)-1	INCER SLOPE FACTOR (mg/kg-day)-1	
INGESTION RATE	Ħ	480	mg/day			
FRACTION INGESTED	E	100%		HAZARD QUOTIENT = INTAKE (mg/kg-day) / REFERENCE DOSE (mg/kg-day)	y) / REFERENCE DOSE (mg/kg-day)	
SOIL ADHERENCE FACTOR	SAF	0.28	mg/cm²			
SURFACE AREA	SA	2200	cm2			
CONVERSION FACTOR	5	10000010	kg/mg	INTAKE = (INTAKE-INGESTION) + (INTAKE-DERMAL)	KE-DERMAL)	
BODY WEIGHT	BW	07	3, 30			
EXPOSURE FREQUENCY	BF	250	days/year	INTAKE-INGESTION = CS x IR x F	CS x IR x Fl x CF x EF x ED	
EXPOSURE DURATION	ED	0.25	years	BW×A7	BW x AT x 365 days/yr	
AVERAGING TIME						
CANCER	AT	70	years	INTAKE-DERMAL = CS x SA x SAF	CS x SA x SAF x AE x CF x BF x BD	
NONCANCER	AT	0.25	years	BWxAT	BW x AT x 365 days/yr	
DERMAL ABSORPTION	AE	Chemical-specific	unitless			
EFFICIENCY						
Notes:						
For noncarcinogenic effects: AT = ED						
The dermal absorption efficiency is from the Risk Assessment Guidance for Superfund Volume 1:	Risk Assessment Guidance	for Superfund Volume 1:				
Human Health Evaluation Manual Supplemental Guidance Dermal Risk Assessment, 1998.	ital Guidance Dermal Risk	Assessment, 1998.				
*The lesser of the 95 % upper confidence limit (UCL) & maximum concentration.	it (UCL) & maximum con	centration.				
ND = Value not determined						
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CON-SS3I(CT)
INCIDENTAL INGESTION OF AND DERMAL CONTACT WITH SURFACE SOIL - CENTRAL TENDENCY
FUTURE CONSTRUCTION WORKER
AOC 57 AREA 3 INDUSTRIAL
FORT DEVENS, MA

## CARCINOGENIC EFFECTS

1.0E-07   1.1E-06   100.00%	
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TOTAL CANCER RISK	
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COMPOUND	SOIL CONCENTRATION (mg/kg)	INTAKE INGESTION (mg/kg-day)	DERMAL ABSORPTION EFFICENCY	INTAKE DERMAL (mg/kg-day)	REFERENCE DOSE ORAL DERM (mg/kg-(49)) (mg/kg-	E DOSE DERMAL (mg/kg-day)	HAZARD QEOTIENT INGESTION	BAZARD QUOTIENT DERMAL	TOTAL HAZARD QUOTIENT	PERCENT TOTAL RISK
Arsenic	41	1.9E-04	0.03	1.8E-05	3.0E-04	2.9E-04	6.4E-01	6.0E-02	7.0E-01	95.04%
Iron	8040	3.8E-02	Ð	0.0E+00	ND	ΩN				
Manganese	548	2.6E-03	QN	0.0E+00	7.1E-02	4.30E-03	3.6E-02	0.0E+00	3.6E-02	4.91%
VPH										
C9-C12 Aliphatics	16	7.5E-05	0.17	3.9E-05	6.0E+00	5.5E+00	1.3E-05	7.0E-06	2.0E-05	0.003%
C9-C10 Aronatics	4.85	2.3E-05	0.17	1.2E-05	3.0E-01	2.7E-01	7.6E-05	4.4E-05	1.2E-04	0.02%
EPH									ţ	
C9-C18 Aliphatics	3.6	1.7E-05	0.17	8.8E-06	6.0E+00	5.5E+00	2.8E-06	1.6E-06		0.001%
C19-C36 Aliphatics	38	1.8E-04	0.17	9.2E-05	6.0E+01	5.5E+01	3.0E-06	1.7E-06		%100.0
C11-C22 Aromatics	01	4.6E-05	0.17	2.4E-05	3.0E-01	2.7E-01	1.5E-04	8.7E-05	2.4E-04	0.03%
				SUMMARY	SUMMARY HAZARDINDEX	X	70	90:0	0:7	



CON-SSJICT) INHALATION EXPOSURE TO PARTICULATES IN SURFACE SOIL - CENTRAL TENDENCY FUTURE CONSTRUCTION WORKER AOC 57 AREA 3 INDUSTRIAL FORT DEVENS, MA

## EXPOSURE PARAMETERS

EQUATIONS

	CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR (mg/kg-day)-1		HAZARD QUOTIENT = INTAKE (mg/kg-day) / REFERENCE CONCENTRATION (mg/kg-day)			INTAKE - INHALATION = <u>(CAp + Cav) x RAF x lihR x ET x EF x ED</u>	BW x AT x 365 days/yr			AIR CONCENTRATION PARTICULATES = CS x 1/PEF		AIR CONCENTRATION VOLATILES = CS x I/VF	(VF not calculated because there are no VOCs selected as CPCs).		
UNITS	mg/kg	mg/m³		m³/kg	ug/m³	m³/hour	kg	hours/day	days/year	years /			years (	years	
5	E				ā			noų						۶	ion
AALUE	See below	Calculated	Calculated	Calculated	1.32E+09	3.3	70	8	250	0.25	%001		92	0.25	(UCL) & maximum concentration
70								•							it (UCL) & ma
SYMBO	ಬ	CAp	CA	VF	PEF	lhR	BW	ET	EF	G	RAF		AT	AT	confidence lim
PARÁMETER PARÁMETER	CONCENTRATION SOIL*	CONCENTRATION AIR PARTICULATES	CONCENTRATION AIR VOLATILES	VOLATILIZATION FACTOR**	PARTICULATE EMISSIONS FACTOR	INHALATION RATE	BODY WEIGHT	EXPOSURE TIME	EXPOSURE FREQUENCY	EXPOSURE DURATION	RELATIVE ABSORPTION FACTOR	AVERAGING TIME	CANCER	NONCANCER	Notes: * Soil concentration used is the lesser of the 95 % upper confidence limit **Volatilization factor used only for volatile chemicals of potential concern. For noncarcinogenic effects: AT = ED

ND = Value not determined

CON-SSJICT)
INHALATION EXPOSURE TO PARTICULATES IN SURFACE SOIL - CENTRAL TENDENCY
FUTURE CONSTRUCTION WORKER
AOC 57 AREA 3 INDUSTRIAL
FORT DEVENS, MA

#### CARCINOGENIC EFFECTS

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фанарам	SOLL CONCENTRATION (mg/kg)	V.F.	AIR CONCENTRATION VOLATILES FARTIC (rig/m²) (ng/m²)	KTRATION PARTICULATES INTAKE (op/m²) (op/kg·dsy)	INTAKE (mg/kg+day)	REFERENCE DOSE (Ing/kg-day):	HAZARD	PERCENT TOTAL RISK
Arsenic	41	ΑN		3.1E-08	8.0E-09	QN		
lon	8040	Ϋ́		6.1E-06	1.6E-06	QX		
Manganese	548	ΝA		4.2E-07	1.1E-07	1.4E-05	7.7E-03	100.00%
VPH	71	Y.		1.26-08	1 1F-00	5.75+00	5.5E-10	0.000000072
C9-C12 Auphatics	4.85			3.7E-09	9.5E-10	1.7E-01	5.6E-09	0.00000073
ЕРН		;		i c	5	9	70 10	310000000
C9-C18 Aliphatics	3.6	Y Z		2.85-09	7.45-00	S. /E+00	01-37:1	0.0000000
C19-C36 Aliphatics C11-C22 Aromatics	38	X X		7.4E-09	1.9E-09	2.0E-01	9.5E-09	0.0000012
					SUMMARY	SUMMARY HAZARD INDEX	0.008	

CON-SB3I(CT)
INCIDENTAL INGESTION OF AND DERMAL CONTACT WITH SUBSURFACE SOIL - CENTRAL TENDENCY
FUTURE CONSTRUCTION WORKER
AOC 57 AREA 3 INDUSTRIAL
FORT DEVENS, MA

14-Mar-00

EXPOSURE PARAMETERS

CONCENTRATION SOIL	S	See Below*	mg/kg	CANCER RISK = INTAKE	CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR (mg/kg-day)-1
INGESTION RATE	Ħ	480	mg/day		
FRACTION INGESTED	Œ	%001		HAZARD QUOTIENT = IF	HAZARD QUOTIENT = INTAKE (mg/kg-day) / REFERENCE DOSE (mg/kg-day)
SOIL ADHERENCE FACTOR	SAF	0.28	mg/cm²		
SURFACE AREA	SA	5200	cm ²		
CONVERSION FACTOR	ర	0.000001	kg/mg	INTAKE = (INTAKE-ING)	INTAKE = (INTAKE-INGESTION) + (INTAKE-DERMAL)
BODY WEIGHT	BW	70	kg		
EXPOSURE FREQUENCY	Ð	250	days/year	INTAKE-INGESTION =	CS x IR x FI x CF x EF x ED
EXPOSURE DURATION	ED	0.25	years		BW x AT x 365 days/yr
AVERAGING TIME					
CANCER	AT	70	years	INTAKE-DERMAL =	CS x SA x SAF x AE x CF x EF x ED
NONCANCER	AT	0.25	years		BW x AT x 365 days/yr
DERMAL ABSORPTION	AE	Chemical-specific	unitless		
EFFICIENCY					
Notes:					
For noncarcinogenic effects: AT = ED					
The dermal absorption efficiency is from the Risk Assessment Guidance for Superfund Volume I:	isk Assessment Guidance	for Superfund Volume I:			
Human Health Evaluation Manual Supplemental Guidance Dermal Risk Assessment, 1998.	al Guidance Dermal Risk	Assessment, 1998.			
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CON-SB3I(CT)
INCIDENTAL INGESTION OF AND DERMAL CONTACT WITH SUBSURFACE SOIL - CENTRAL TENDENCY
FUTURE CONSTRUCTION WORKER
AOC 57 AREA 3 INDUSTRIAL
FORT DEVENS, MA

## CARCINOGENIC EFFECTS

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TOTAL CANCER RISK	2.7E-07	9
FOTAL ANCER RISK	2.71	·
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2. Aliphatics         9.67         4.5E-05         0.03         4.1E-06         3.0E-04         2.9E-04         1.5E           2. Aliphatics         0.84         3.0E-05         ND         0.0E+00         ND         ND         ND           2. Aliphatics         0.35         1.6E-06         0.17         2.0E-06         6.0E+00         5.5E+00         6.6I           3. Aromatics         78         3.7E-04         0.17         1.9E-04         6.0E+00         5.5E+00         6.1I           2. Aromatics         110         5.2E-04         0.17         2.7E-04         3.0E-01         2.7E-01         7.7I	2 Aliphatics 0.17 CA-Fe-05 0.03 4.1E-06 3.0E-04 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-01 1.5E-0	СОМРОЦИФ	SOIL CONCENTRATION Implies	INTAKE INGESTION (ng/ke-day)	DERMAL ABSORPTION EFFICENCY	INTAKE DERMAL (mg/kg-day)	REFERENCE DOSE ORAL DEFRI	CE DOSE DERMAL (mg/kg-day)	HAZARD QUOTIENT INGESTION	HAZARD QUOTIENT DERMAL	TOTAL HAZARD QUOTEENT	PERCENT TOTAL RISK
Aliphatics	Aliphatics         0.84         3.0E-06         ND         0.0E+00         ND         ND         ND         ND         ND         ND         ND         ND         ND         ND         ND         ND         ND         ND         ND         ND         ND         ND         ND         ND         ND         ND         ND         ND         ND         ND         ND         ND         ND         ND         ND         ND         ND         ND         ND         ND         ND         ND         ND         ND         ND         ND         ND         ND         ND         ND         ND         ND         ND         ND         ND         ND         ND         ND         ND         ND         ND         ND         ND         ND         ND         ND         ND         ND         ND         ND         ND         ND         ND         ND         ND         ND         ND         ND         ND         ND         ND         ND         ND         ND         ND         ND         ND         ND         ND         ND         ND         ND         ND         ND         ND         ND         ND         ND         ND         ND<	Arsenic	9.67		0.03	4.1E-06	3.0E-04	2.9E-04	1.5E-01	1.4E-02	1.7E-01	98.26%
A Aliphatics         0.84         3.9E-06         0.17         2.0E-06         6.0E+00         5.5E+00         6.6E-07         3.7E-07         1.0E-06         0           A Aromatics         0.35         1.6E-06         0.17         8.5E-07         3.0E-01         2.7E-01         5.5E+06         6.6E-07         3.1E-06         8.6E-06           8 Aliphatics         78         3.7E-04         0.17         1.9E-04         6.0E+01         5.5E+00         6.1E-05         3.4E-05         9.5E-05           8 Aliphatics         990         4.6E-03         0.17         2.4E-03         6.0E+01         5.5E+01         7.7E-05         4.4E-05         1.2E-04           22 Aromatics         110         5.2E-04         0.17         2.7E-04         3.0E-01         1.7E-03         9.9E-04         2.7E-03	Aliphatics         0.84         3.9E-06         0.17         2.0E-06         6.0E+00         5.5E+00         6.6E-07         3.7I           A Ariphatics         0.35         1.6E-06         0.17         8.5E-07         3.0E-01         2.7E-01         5.5E-06         3.1I           S Aliphatics         78         3.7E-04         0.17         1.9E-04         6.0E+01         5.5E+01         6.1E-05         3.44           2. Aromatics         990         4.6E-03         0.17         2.7E-04         3.0E-01         2.7E-01         1.7E-03         9.91           2. Aromatics         110         5.2E-04         0.17         2.7E-04         3.0E-01         1.7E-03         9.91	E.	6410		ZZ	0.0E+00	QN					
Adiphatics         78         3.7E-04         0.17         8.5E-07         3.0E-01         2.7E-01         5.5E-06         3.1E-06         8.6E-06           Adiphatics         78         3.7E-04         0.17         1.9E-04         6.0E+00         5.5E+00         6.1E-05         3.4E-05         9.5E-05           56 Aliphatics         990         4.6E-03         0.17         2.4E-03         6.0E+01         5.5E+01         7.7E-05         4.4E-05         1.2E-04           22 Aromatics         110         5.2E-04         0.17         2.7E-04         3.0E-01         1.7E-03         9.9E-04         2.7E-03	Aromatics         0.17         8.5E-07         3.0E-01         2.7E-01         5.5E-06         3.11           Aromatics         78         3.7E-04         0.17         1.9E-04         6.0E+01         5.5E+00         6.1E-05         3.41           24 Aromatics         990         4.6E-03         0.17         2.4E-03         6.0E+01         5.5E+01         7.7E-05         4.41           22 Aromatics         110         5.2E-04         0.17         2.7E-04         3.0E-01         1.7E-03         9.99	H. H. H. H. H. H. H. H. H. H. H. H. H. H	0.84		0.17		6.0E+00	5.5E+00	6.6E-07	3.7E-07	1.0E-06	0.001%
8 Aliphatics         78         3.7E-04         0.17         1.9E-04         6.0E+00         5.5E+00         6.1E-05         3.4E-05         9.5E-05           86 Aliphatics         990         4.6E-03         0.17         2.7E-03         6.0E+01         5.5E+01         7.7E-05         4.4E-05         1.2E-04           22 Aromatics         110         5.2E-04         0.17         2.7E-04         3.0E-01         2.7E-01         1.7E-03         9.9E-04         2.7E-03	8 Aliphatics       78       3.7E-04       0.17       1.9E-04       6.0E+00       5.5E+00       6.1E-05       3.44         56 Aliphatics       990       4.6E-03       0.17       2.4E-03       6.0E+01       5.5E+01       7.7E-05       4.41         22 Aromatics       110       5.2E-04       0.17       2.7E-04       3.0E-01       2.7E-01       1.7E-03       9.91	-C12 Ampuatics	0.35		0.17		3.0E-01	2.7E-01	5.5E-06	3.1E-06	8.6E-06	0.01%
990 4.6E-03 0.17 2.4E-03 6.0E+01 5.5E+01 7.7E-05 4.4E-05 1.2E-04 1.0E-01 2.7E-01 1.7E-03 9.9E-04 2.7E-03	990 4.6E-03 0.17 2.4E-03 6.0E+01 5.5E+01 7.7E-05 4.4I 110 5.2E-04 0.17 2.7E-04 3.0E-01 2.7E-01 1.7E-03 9.9I	H.	7.8		0.17		6.0E+00	5.5E+00	6.1E-05		9.5E-05	0.06%
110 5.2E-04 0.17 2.7E-04 3.0E-01 2.7E-01 1.7E-03 9.9E-04 2.7E-03	110 5.2E-04 0.17 2.7E-04 3.0E-01 2.7E-01 1.7E-03 9.91 c.17E-04 3.0E-01 2.7E-01 1.7E-03 9.91	9.C36 Alinhatics	066		0.17		6.0E+01	5.5E+01	7.7E-05	`	1.2E-04	0.07%
	- 0.2	1-C22 Aromatics	110		0.17		3.0E-01	2.7E-01	1.7E-03	9.9E-04	2.7E-03	1.61%
	2											

CON-SB3I(CT)
INHALATION EXPOSURE TO PARTICULATES IN SUBSURFACE SOIL - CENTRAL TENDENCY
FUTURE CONSTRUCTION WORKER
AOC 57 AREA 3 INDUSTRIAL
FORT DEVENS, MA

## EXPOSURE PARAMETERS

PARAMETER	SYMBOL	VALUE	UNITS	
CONCENTRATION SOIL*	S	See below	mg/kg	CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR (mg/kg-day)-1
CONCENTRATION AIR PARTICULATES	CAp	Calculated	mg/m³	
CONCENTRATION AIR VOLATILES	CAv	Calculated	mg/m³	HAZARD QUOTIENT = INTAKE (mg/kg-day) / REFERENCE CONCENTRATION (mg/kg-day)
VOLATILIZATION FACTOR**	VF	Calculated	m³/kg	
PARTICULATE EMISSIONS FACTOR	PEF	1.32E+09	ng/m³	
INHALATION RATE	IbR	3.3	m³/hour	INTAKE - INHALATION = $(CAp + Cay) \times RAF \times IIR \times ET \times EF \times ED$
BODY WEIGHT	BW	70	kg	BW x AT x 365 days/yr
EXPOSURE TIME	ET	80	hours/day	
EXPOSURE FREQUENCY	臣	250	days/year	
EXPOSURE DURATION	8	0.25	years	AIR CONCENTRATION PARTICULATES = $CS \times 1/PEF$
RELATIVE ABSORPTION FACTOR	RAF	%001		
AVERAGING TIME				AIR CONCENTRATION VOLATILES = CS x 1/VF
CANCER	AT	70	years	(VF not calculated because there are no VOCs selected as CPCs).
NONCANCER	AT	0.25	years	
Notes: * Soil concentration used is the lesser of the 95 % upper confidence limit (UCL) & maximum concentration	er confidence limit (UCL) & n	naximum concentration		
**Volatilization factor used only for volatile chemicals of potential concern.	ntial concern.			
For noncarcinogenic effects: AT = ED				
ND = Value not determined				

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CON-SB3I(CT)
INHALATION EXPOSURE TO PARTICULATES IN SUBSURFACE SOIL - CENTRAL TENDENCY
FUTURE CONSTRUCTION WORKER
AOC 57 AREA 3 INDUSTRIAL
FORT DEVENS, MA

#### CARCINOGENIC EFFECTS

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Arsenic Iron VPH C9-C12 Aliphatics C9-C10 Aromatics EPH C9-C18 Aliphatics C19-C36 Aliphatics C11-C22 Aromatics					Alib	Aroi		Alip	Ž	Arc		
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Arsenic Iron VPH C9-C12 C9-C10 EPH C9-C18 C19-C3 C11-C22 C11-C22		ISC.	ē	표	8	3	H	5	61.	Ė		

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INCIDENTAL INGESTION OF AND DERMAL CONTACT WITH SURFACE SOIL - RME UNRESTRICTED LAND USE - ADULT RESIDENT AOC 57 AREA 3 INDUSTRIAL FORT DEVENS, MA

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#### EXPOSURE PARAMETERS

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TOR SAF 100 mg/day  FI 100% SAF 0.08 mg/cm² SA 5,800 cm² CF 0.000001 kg/mg BW 70 kg  Y EF 150 cm² 24 years  CANCER AT 24 years  AT 24 years  AT AT 24 HD  AT BB Chemical-specific unitless  TORENIA ASSESSEMENT Guidance for Superfund Volume I:  annal Supplemental Guidance Dermal Risk Assessment, 1998.  Tronfidence limit (UCL) & maximum concentration.  NE = Route not evaluated	CONCENTRATION SOIL	CS	See Below*	mg/kg	CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR (mg/kg-day)-1
TOR         SAF         100%         mg/cm²           ED         SAF         0.08         mg/cm²           V         EF         0.000001         kg/mg           V         EF         150         days/year           ED         AT         24         years           ONCANCER         AT         70         years           AT = ED         AT         24         years           AT = ED         AT         24         years           AT = ED         AE = Chemical-specific         unitless           AT = ED         Assessment Guidance for Superfund Volume I:         annual Supplemental Guidance Dermal Risk Assessment, 1998.           AT = ED         AT = BD         AT = BD         AT = BD           AT = ED         AT = BD         AT = BD         AT = BD           AT = BD         AT = BD         AT = BD         AT = BD           AT = BD         AT = BD         AT = BD         AT = BD           AT = BD         AT = BD         AT = BD         AT = BD           AT = BD         AT = BD         AT = BD         AT = BD           AT = BD         AT = BD         AT = BD         AT = BD           AT = BD         AT = BD         <	INGESTION RATE	R	001	mg/day	
TOR         SAF         0.08         mg/cm²         INTAKE=(INTAKE-INGESTION = 5,800         cm²         INTAKE-INGESTION = (INTAKE-INGESTION = 4,800         kg/mg         INTAKE-INGESTION = 1,800         kg/mg         INTAKE-INGESTION = 1,800         kg/mg         INTAKE-INGESTION = 1,800         kg/mg         INTAKE-INGESTION = 1,800         kg/mg         INTAKE-INGESTION = 1,800         kg/mg         INTAKE-INGESTION = 1,800         kg/mg         INTAKE-INGESTION = 1,800         kg/mg         INTAKE-INGESTION = 1,800         kg/mg         intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intake-Intak	FRACTION INGESTED	E	%001		HAZARD QUOTIENT = INTAKE (mg/kg-day) / REFERENCE DOSE (mg/kg-day)
ED         SA         5,800         cm²         INTAKE-INGESTION =           V         EF         0,000001         kg/mg         INTAKE-INGESTION =           V         EF         150         days/year         INTAKE-INGESTION =           CANCER         AT         70         years         INTAKE-DERMAL =           CANCER         AT         24         years         INTAKE-DERMAL =           AT = ED         AT         24         years         INTAKE-DERMAL =           AT = ED           AT = ED           Are sessment Guidance for Superfund Volume I:           anual Supplemental Guidance Dermal Risk Assessment, 1998.           are confidence limit (UCL) & maximum concentration.           NE = Route not evaluated           NE = Route not evaluated	SOIL ADHERENCE FACTOR	SAF	80:0	mg/cm²	
Y         EF         0.000001         kg/mg         INTAKE-INGESTION =           BW         70         kg         INTAKE-INGESTION =           CANCER         AT         24         years         INTAKE-DERMAL =           CANCER         AT         70         years         INTAKE-DERMAL =           ANCANCER         AT         24         years         INTAKE-DERMAL =           AT = ED         Chemical-specific         unitless         AE         Chemical-specific           AT = ED         AE         Chemical-specific         unitless         AE         AE           AT = ED         AE         Chemical-specific         unitless         AE         AE           AT = ED         AE         AE         AE         AE         AE           AT = ED         AE         AE         AE         AE         AE           AT = ED         AE         AE         AE         AE         AE           AT = ED         AE         AE         AE         AE         AE           AT = ED         AE         AE         AE         AE         AE	SURFACE AREA EXPOSED	SA	2,800	cm²	INTAKE = (INTAKE-INGESTION) + (INTAKE-DERMAL)
Y         EBW         70         kg         INTAKE-INGESTION =           CANCER         AT         24         years         INTAKE-DERMAL =           CANCER         AT         70         years         INTAKE-DERMAL =           NNCANCER         AT         24         years         INTAKE-DERMAL =           AT = ED         Chemical-specific         unitless         AT         AT           AT = ED         AE         Chemical-specific         unitless         AT           AT = ED         AE         Superfund Volume I:         AT         AT           anual Supplemental Guidance Dermal Risk Assessment, 1998.         AT         AT         AT           AT = ED         AT         AT         AT         AT           AT = ED         AT         AT         AT         AT           AT = ED         AT         AT         AT         AT           AT = ED         AT         AT         AT         AT           AT = ED         AT         AT         AT         AT           AT = ED         AT         AT         AT         AT           AT = ED         AT         AT         AT         AT           AT = ED	CONVERSION FACTOR	ង	0.000001	kg/mg	
V         EF         150         days/year           ED         24         years           CANCER         AT         70         years           NNCANCER         AT         24         years           NNCANCER         AT         24         years           AE         Chemical-specific         unitless    AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT	BODY WEIGHT	BW	70	kg	
ED   24   years	EXPOSURE FREQUENCY	H	150	days/year	BW x AT x 365 days/yr
CANCER AT 70 years  NCANCER AT 24 years  AE Chemical-specific unitless  AT = ED  and Supplemental Guidance Pormal Risk Assessment, 1998.  are supplemental Culclu, & maximum concentration.  NE = Route not evaluated	EXPOSURE DURATION	Œ	24	years	
CANCER     AT     70     years       DNCANCER     AT     24     years       AB     Chemical-specific     unitless    AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT = BD  AT	AVERAGING TIME				
AT Chemical-specific  AE Chemical-specific  AT = BD  AT = BD  Ar = BD  Ar = BD  Ar = BD  Ar = BD  Ar = BD  Ar = BD  Ar = BD  Ar = BD  Ar = BD  Ar = BD  Ar = BD  Ar = BD  Ar = BD  Ar = BD  Ar = BD  Ar = BD  Ar = BD  Ar = BD		AT	02	years	BW x AT x 365 days/yr
AT = BD  AT = BD  noy is from the Risk Assessment Guidance for Superfund Volume I: anual Supplemental Guidance Dermal Risk Assessment, 1998.  r confidence limit (UCL) & maximum concentration.  NE = Route not evaluated	NONCANCER	AT	24	years	
Notes:  Notes:  For noncarcinogenic effects: AT = ED  For noncarcinogenic effects: AT = ED  The dermal absorption efficiency is from the Risk Assessment Guidance for Superfund Volume I:  Human Health Evaluation Manual Supplemental Guidance Dermal Risk Assessment, 1998.  *The lesser of the 95 % upper confidence limit (UCL) & maximum concentration.  ND = Value not determined  NE = Route not evaluated	DERMAL ABSORPTION	AE	Chemical-specific	unitless	
Notes:  For noncarcinogenic effects: AT = ED  The dermal absorption efficiency is from the Risk Assessment Guidance for Superfund Volume I:  Human Health Evaluation Manual Supplemental Guidance Dermal Risk Assessment, 1998.  *The lesser of the 95 % upper confidence limit (UCL) & maximum concentration.  ND = Value not determined  NE = Route not evaluated	EFFICIENCY				
For noncarcinogenic effects: AT = ED  The dermal absorption efficiency is from the Risk Assessment Guidance for Superfund Volume I:  Human Health Evaluation Manual Supplemental Guidance Dermal Risk Assessment, 1998.  *The Lesser of the 95 % upper confidence limit (UCL) & maximum concentration.  ND = Value not determined  NE = Route not evaluated	Notes:				
The dermal absorption efficiency is from the Risk Assessment Guidance for Superfund Volume I:  Human Health Evaluation Manual Supplemental Guidance Dermal Risk Assessment, 1998.  *The Lesser of the 95 % upper confidence limit (UCL) & maximum concentration.  ND = Value not determined  NE = Route not evaluated	For noncarcinogenic effects: AT = ED				
Human Health Evaluation Manual Supplemental Guidance Dermal Risk Assessment, 1998.  *The Lesser of the 95 % upper confidence limit (UCL) & maximum concentration.  ND = Value not determined  NE = Route not evaluated	The dermal absorption efficiency is from the R	tisk Assessment Guidance	for Superfund Volume I:		
*The lesser of the 95 % upper confidence limit (UCL) & maximum concentration.  ND = Value not determined NE = Route not evaluated	Human Health Evaluation Manual Supplement	ital Guidance Dermal Risk	Assessment, 1998.		
	*The lesser of the 95 % upper confidence limit	it (UCL) & maximum conc	centration.		
	ND = Value not determined	NE = Route not evaluated			

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RES-SS31
INCIDENTAL INGESTION OF AND DERMAL CONTACT WITH SURFACE SOIL - RME
UNRESTRICTED LAND USE - ADULT RESIDENT
AOC 57 AREA 3 INDUSTRIAL
FORT DEVENS, MA

## CARCINOGENIC EFFECTS

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COMPOUND	SOIL CONCENTRATION (mg/kg)	INTAKE INGESTION (mg/kg-day)	DERMAL ABSORPTION BPRICENCY	INTAKE DERMAL (mg/kg-day)	ORAL DERM  (wig/re-day) (wg/rg-	EDOSE DERNAL (mg/kg-day)	HAZARD QUOTIENT INGESTION	HAZARD QUOTIENT DERMAL	TOTAL HAZARD QUOTIENT	PERCENT TOTAL RISK
Arsenic	41	2.4E-05	0.03	3.4E-06	3.0E-04	2.9E-04	8.0E-02	1.2E-02	9.2E-02	94.73%
Iron	8040	4.7E-03	QN		ND	Q				
Manganese	548	3.2E-04	ΩN		7.16-02	Ω	4.5E-03		4.5E-03	4.68%
VPH C9-C12 Alimbatics	16	9.4E-06	0.17	7.4E-06	6.0E-01	5.5E-01	1.6E-05	1.3E-05	2.9E-05	0.03%
C9-C10 Aronatics	4.85	2.8E-06	0.17	2.2E-06	3.0E-02	2.7E-02	9.5E-05	8.3E-05	1.8E-04	0.18%
EPH HELD CO.	25.5	2 1E_06	710	1 7E-06	6.0E-01	5.5E-01	3.6E-06	3.1E-06	6.6E-06	0.01%
Cy-C16 Auphatics	38		0.17	_		5.5E+00	3.7E-06	3.2E-06	6.9E-06	0.01%
C11-C22 Aromatics	01		0.17	•		2.7E-02	1.9E-04	1.7E-04	3.6E-04	0.37%
				SUMMARY	SUMMARY HAZARD INDEX	×	60'9	¥0'0	1.0	

RES-SSJ INHALATION EXPOSURE TO PARTICULATES IN SURFACE SOIL - RME UNRESTRICTED LAND USE - ADULT RESIDENT AOC 57 AREA 3 INDUSTRIAL FORT DEVENS, MA

EXPOSURE PARAMETERS

PARANETER	SYMBOL	VALUE	UNITS	
CONCENTRATION SOIL*	S	See below	mg/kg	CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR (mg/kg-day)-1
CONCENTRATION AIR PARTICULATES	CAp	Calculated		
CONCENTRATION AIR VOLATILES	CAv	Calculated	mg/m³	HAZARD QUOTIENT = INTAKE (mg/kg-day) / REFERENCE CONCENTRATION (mg/kg-day)
VOLATILIZATION FACTOR**	VF	Calculated	m³/kg	
PARTICULATE EMISSIONS FACTOR	PEF	1.32E+09		
INHALATION RATE	IhR	0.63		INTAKE - INHALATION = $(Ca_D + Ca_V) \times RAF \times IhR \times ET \times EF \times ED$
BODY WEIGHT	BW	70	r gy	BW x AT x 365 days/yr
EXPOSURE TIME	EI	80	hours/day	
EXPOSURE FREQUENCY	49	150	days/year	
EXPOSURE DURATION	ED	24	years	AIR CONCENTRATION PARTICULATES = $CS \times 1/PEF$
RELATIVE ABSORPTION FACTOR	RAF	100%		
AVERAGING TIME		*****		AIR CONCENTRATION VOLATILES = CS x 1/VF
CANCER	AT	70	years	(VF not calculated because there are no VOCs selected as CPCs).
NONCANCER	AT	24	years	
Notes: * Soil concentration used is the lesser of the 95 % upper confidence limit (UCL) & maximum concentration	r confidence limit (UCL) & 1	naximum concentration		
**Volatilization factor used only for volatile chemicals of potential concern.	tial concern.			
For noncarcinogenic effects: AT = ED				
ND = Value not determined				

RES-SS31 INHALATION EXPOSURE TO PARTICULATES IN SURFACE SOIL - RME UNRESTRICTED LAND USE - ADULT RESIDENT AOC 57 AREA 3 INDUSTRIAL FORT DEVENS, MA

#### CARCINOGENIC EFFECTS

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PERCENT TOTAL RISK			100.00%	0.00000072	0.0000073	0.00000016		0.000012	
¥ F					0				
0 Z			8.8E-04	6.3E-10	6.4E-09	1.4E-10		1.1E-08	0.001
HAZARD QUOTIENT			8.8	6.3E	6.4E	1.4E		1.1E	0
÷Š									
	2	g	05	5	02		g	02	SUMMARY HAZARD INDEX
REFERENCE DOSE (mg/kg-day)	-	_	1.4E-05	5.7E-01	1.7E-02	S.7E-01		2.0E-02	NOE
KEFERENC DOSE (mg/kg-day)			_	۷.	_	•,		•	20
RE TE									ZA
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<u>.</u>	9.2E-10	1.8E-07	1.2E-08	3.6E-10	1.1E-10	8.1E-11	8.5E-10	2.2E-10	¥Κ
INTAKE ng/kg-day)	9.21	1.8	1.21	3.6	Ξ	8.11	8.5	2.2	MAN
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TES INTAKE (n)g/kg-tlay)	80:	90-	-07	-So	Ş	6	80	န	
¥	3.1E-08	6.1E-06	4.2E-07	1.2E-08	3.7E-09	2.8E-09	2.9E-08	7.4E-09	
ARTICULA (mg/m²)									
AIR CONCENTRATION ALATILES FARTICULATES (mg/m²) (mg/m²)									
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AIR CONCER VOLATILES (mg/m²)									
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у. (m ⁹⁷ kg)									
Z	4	8040	548	16	4.85	3.6	38	2	
SOCE CONCENTRATION (mg/kg)		œ			4				
SOEL NCENTRA (mg/kg)									
SOIL ONCENTRA (mg/kg)									
8									
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	į								
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COMPOUND									
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				i.	tics	ics	C19-C36 Alinhatics	artics	
			Ð	VPH C9-C12 Alimbatics	5.00	linha	A Lin	Aron	
	Arsenic	Iron	Manganese	VPH C9-C12 A	C9-C10 Aromatics	EPH C9-C18 A	36	C11-C22 Aronatics	

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INCIDENTAL INGESTION OF AND DERMAL CONTACT WITH SURFACE SOIL - RME UNRESTRICTED LAND USE - CHILD RESIDENT (1 TO 6 YEARS)
AOC 57 AREA 3 INDUSTRIAL
FORT DEVENS, MA

14-Mar-00

#### **EXPOSURE PARAMETERS**

-			CANCED DISK = INTAKE (ms/km-day) * CANCER	
	See Below*	mg/kg	CAILCEN MON - DITANE (INGNETIA) A COLLCEN	CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR (mg/kg-day)-1
	200	mg/day	·	
FRACTION INGESTED	100%		HAZARD QUOTIENT = INTAKE (mg/kg-day) / REFERENCE DOSE (mg/kg-day)	FERENCE DOSE (mg/kg-day)
SOIL ADHERENCE FACTOR SAF	-	mg/cm²		
SURFACE AREA EXPOSED SA	2,045	cm²	INTAKE = (INTAKE-INGESTION) + (INTAKE-DERMAL)	RMAL)
CONVERSION FACTOR CF	0.000001	kg/mg		
BODY WEIGHT BW	15	kg	INTAKE-INGESTION = CS x IR x F1 x CF x EF x ED	<u> </u>
EXPOSURE FREQUENCY EF	150	days/year	BW x AT x 365 days/yr	days/yr
EXPOSURE DURATION ED	9	years		
AVERAGING TIME			$INTAKE-DERMAL = CS \times SA \times SAF \times AE \times CF \times EF \times ED$	CF x EF x ED
CANCER AT	0,	years	BW x AT x 365 days/yr	days/yr
NONCANCER AT	9	years		
DERMAL ABSORPTION AE	Chemical-specific	unitless		
EFFICIENCY				
Notes:				
For noncarcinogenic effects: AT = ED				
The dermal absorption efficiency is from the Risk Assessment Guidance for Superfund Volume I:	for Superfund Volume I:			
Human Health Evaluation Manual Supplemental Guidance Dermal Risk Assessment, 1998.	: Assessment, 1998.			
*The lesser of the 95 % upper confidence limit (UCL) & maximum concentration.	centration.			

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RES-SS31
INCIDENTAL INGESTION OF AND DERMAL CONTACT WITH SURFACE SOIL - RME
UNRESTRICTED LAND USE - CHILD RESIDENT (1 TO 6 YEARS)
AOC 57 AREA 3 INDUSTRIAL
FORT DEVENS, MA

#### CARCINOGENIC EFFECTS

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ERCENT TOTAL RISK	100.00%	
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TOTAL ANCER RISK	18.8	4
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QNI)OMBO)	CONCENTRATION	INTAKE INGESTION	DERMAL ABSORPTION REPICTION	INTAKE DERMAL (me/ke-day)	REFERÊNCE DOSE ORAL DERM (mg/kg-day) (mg/kg-	DERMAL (mg/kg-day)	HAZARD QUOTIENT INGESTION	BAZARO QUOTIENT DERMAL	TOTAL HAZARD QUOTFENT	PERCENT TOTAL RISK
Arsenic	41	2.2E-04	0.03	6.9E-05	3.0E-04	2.9E-04	7.5E-01	2.4E-01	9.9E-01	95.11%
Iron	8040	4.4E-02	DN		QN	Q				
Manganese	548	3.0E-03	QN		7.1E-02	QN	4.2E-02		4.2E-02	4.08%
<u>VPH</u> C9-C12 Alinhatics	91	8.8E-05	0.17	1.5E-04	6.0E-01	5.5E-01	1.5E-04	2.8E-04	4.2E-04	0.04%
C9-C10 Aromatics	4.85	2.7E-05	0.17	4.6E-05	3.0E-02	2.7E-02	8.9E-04	1.7E-03	2.6E-03	0.25%
EPH	3,63	2.0E-05	0.17	3.5E-05	6.0E-01	5.5E-01	3.3E-05	6.3E-05	9.6E-05	0.01%
C7-C10 Aliphatics	38	2.1E-04	0.17	.,	6.0E+00	5.5E+00	3.5E-05	6.6E-05	1.0E-04	0.01%
C11-C22 Aronatics	01	5.3E-05	0.17	9.3E-05	3.0E-02	2.7E-02	1.8E-03	3.4E-03	5.2E-03	0.50%
				300000000000000000000000000000000000000			930000000000000000000000000000000000000			
				SUMMARY	SUMMARY HAZAKU INDEX	*	860			

RES-SS31
INHALATION EXPOSURE TO PARTICULATES IN SURFACE SOIL - RME
UNRESTRICTED LAND USE - CHILD RESIDENT (1 TO 6 YEARS)
AOC 57 AREA 3 INDUSTRIAL
FORT DEVENS, MA

EXPOSURE PARAMETERS

	CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR (mg/kg-day)-1		HAZARD QUOTIENT = INTAKE (mg/kg-day) / REFERENCE CONCENTRATION (mg/kg-day)			INTAKE - INHALATION = (CAP + Cay) x RAF x INR x ET x EF x ED	BW x AT x 365 days/yr			AIR CONCENTRATION PARTICULATES = CS x 1/PEF		AIR CONCENTRATION VOLATILES = CS x 1/VF	(VF not calculated because there are no VOCs selected as CPCs).					
STINO	mg/kg	mg/m³	mg/m³		ug/m³	m³/hour		8 hours/day	150 days/year	6 years AIR CONCENTRATION PARTICULATES = CS		AIR CONCENTRATION VOLATILES = CS x 1/A	70 years (VF not calculated because there are no VOCs selec	6 years	itration			
SYMBOL	CS See below	CAp Calculated	CAv Calculated	VF Calculated	PEF 1.32E+09	IhR 0.31	BW	ET	EF 15	GE	RAF 100%		AT	AT 6	upper confidence limit (UCL) & maximum concenti	otential concern.		
PARAMETER	CONCENTRATION SOIL*	CONCENTRATION AIR PARTICULATES	CONCENTRATION AIR VOLATILES	VOLATILIZATION FACTOR**	PARTICULATE EMISSIONS FACTOR	INHALATION RATE	BODY WEIGHT	EXPOSURE TIME	EXPOSURE FREQUENCY	EXPOSURE DURATION	RELATIVE ABSORPTION FACTOR	AVERAGING TIME	CANCER	NONCANCER	Notes: * Soil concentration used is the lesser of the 95 % upper confidence limit (UCL) & maximum concentration	**Volatilization factor used only for volatile chemicals of potential concern.	For noncarcinogenic effects: AT = ED	

RES-SS31
INHALATION EXPOSURE TO PARTICULATES IN SURFACE SOIL - RME
UNRESTRICTED LAND USE - CHILD RESIDENT (1 TO 6 YEARS)
AOC 57 AREA 3 INDUSTRIAL
FORT DEVENS, MA

CARCINOGENIC EFFECTS

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INCIDENTAL INGESTION OF AND DERMAL CONTACT WITH SUBSURFACE SOIL - RME UNRESTRICTED LAND USE - ADULT RESIDENT AOC 57 AREA 3 INDUSTRIAL FORT DEVENS, MA

03-Feb-00

EXPOSURE PARAMETERS

TOR ED CANCER ONCANCER AT = ED may is from the F re confidence in the F re confidence in the F re confidence in the F	PARAMETER	SYMBOL	VALUE	CNITS		
IR 100 mg/day	CONCENTRATION SOIL	cs	See Below*	mg/kg	CANCER RISK = INTAKE (r	ng/kg-day) x CANCER SLOPE FACTOR (mg/kg-day)-1
FI 100%	INGESTION RATE	R	100	mg/day		
TOR SAF 0.08 mg/cnth ED SA 5,800 cm² INTAKE=(INTAKE-INGES) CF 0.000001 kg/mg INTAKE-INGES/TION = Y EF 34 years INTAKE-DERMAL = CANCER AT 70 years INTAKE-DERMAL = NNCANCER AT 24 years INTAKE-DERMAL = AT = ED AE Chemical-specific unitless Interview in (UCL) & maximum concentration. st confidence limit (UCL) & maximum concentration. seconfidence limit (UCL) & maximum concentration. NE = Route not evaluated NE = Route not evaluated NE = Route not evaluated NE = Route not evaluated	FRACTION INGESTED	E	%001		HAZARD QUOTIENT = INT.	AKE (mg/kg-day) / REFERENCE DOSE (mg/kg-day)
ED SA S,800 cm² INTAKE = (INTAKE-INGES	SOIL ADHERENCE FACTOR	SAF	0.08	mg/cm²		
CF	SURFACE AREA EXPOSED	SA	2,800	cm³	INTAKE = (INTAKE-INGES	TION) + (INTAKE-DERMAL)
Y BW 70 kg INTAKE-INGESTION = EF 150 days/year INTAKE-INGESTION = CANCER AT 24 years INTAKE-DERMAL = NCANCER AT 70 years INTAKE-DERMAL = ACA = ED AE Chemical-specific unitless AT = ED AE Chemical-specific unitless anual Supplemental Guidance Dermal Risk Assessment, 1998. anual Supplemental Guidance Dermal Risk Assessment, 1998. are confidence limit (UCL) & maximum concentration. NE = Route not evaluated NE = Route not evaluated NE = Route not evaluated	CONVERSION FACTOR	£,	0.000001	kg/mg		
Y EF 150 days/year ED 24 years CANCER AT 70 years NCANCER AT 24 years NCANCER AT 24 years AF = ED Chemical-specific unitless AT = ED Chemical-specific unitless anual Supplemental Guidance Dermal Risk Assessment, 1998. anual Supplemental Guidance Dermal Risk Assessment, 1998. are confidence limit (UCL) & maximum concentration. NE = Route not evaluated NE = Route not evaluated NE = Route not evaluated	BODY WEIGHT	BW	70	kg	INTAKE-INGESTION =	CS x IR x FI x CF x EF x ED
CANCER AT 70 years NCANCER AT 70 years NTAKE-DERMAL TO years AE Chemical-specific unitless AT = ED anual Supplemental Guidance Dermal Risk Assessment, 1998. re confidence limit (UCL) & maximum concentration. NE = Route not evaluated	EXPOSURE FREQUENCY	EF	150	days/year	-	BW x AT x 365 days/yr
CANCER AT 70 years NCANCER AT 24 years AE Chemical-specific unitless AT = ED AT = ED AT = ED AT = Rosessment Guidance for Superfund Volume I: anual Supplemental Guidance Dermal Risk Assessment, 1998. The roonfidence limit (UCL) & maximum concentration. NE = Route not evaluated	EXPOSURE DURATION	æ	24	years		
CANCER AT 70 years NCANCER AT 24 years AE Chemical-specific unitless AT = ED	AVERAGING TIME					CS x SA x SAF x AE x CF x EF x ED
AT Chemical-specific AE Chemical-specific AT = ED AT = ED AT = ED AT = ED AT = ED AT = ED AT = ED AT = ED AT = ED New Assessment Guidance for Superfund Volume I: anual Supplemental Guidance Dermal Risk Assessment, 1998. The Route no evaluated AR = Route not evaluated	CANCER	AT	70	years		BW x AT x 365 days/yr
AT = ED AT = ED and Supplemental Guidance for Superfund Volume I: anual Supplemental Guidance Dermal Risk Assessment, 1998. ar confidence limit (UCL) & maximum concentration. NE = Route not evaluated	NONCANCER	AT	24	years		
Notes: For noncarcinogenic effects: AT = ED The dermal absorption efficiency is from the Risk Assessment Guidance for Superfund Volume I: Human Health Evablation Manual Supplemental Guidance Dermal Risk Assessment, 1998. *The leaser of the 95 % upper confidence limit (UCL), a reaxinum concentration. ND = Value non determined.	DERMAL ABSORPTION	AĒ	Chemical-specific	unitless		
Notes: For noncarcinogenic effects: AT = ED The dermal absorption efficiency is from the Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual Supplemental Guidance Dermal Risk Assessment, 1998. *The lesser of the 95 % upper confidence limit (UCL) & maximum concentration. ND = Value not determined NE = Route not evaluated	EFFICIENCY					
For noncarcinogenic effects: AT = ED The dermal absorption efficiency is from the Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual Supplemental Guidance Dermal Risk Assessment, 1998. *The lesser of the 95 % upper confidence limit (UCL) & maximum concentration. ND = Value and determined NE = Route not evaluated	Notes:					
The dermal absorption efficiency is from the Risk Assessment Guidance for Supertland Volume I: Human Health Evaluation Manual Supplemental Guidance Dermal Risk Assessment, 1998. *The lesser of the 95 % upper confidence limit (UCL) & maximum concentration. ND = Value and determined NE = Route and evaluated	For noncarcinogenic effects: AT = ED					
Human Health Evaluation Manual Supplemental Guidance Dermal Risk Assessment, 1998. *The lesser of the 95 % upper confidence limit (UCL) & maximum concentration. ND = Value and determined NE = Route and evaluated	The dermal absorption efficiency is from the Ri	isk Assessment Guidance	for Superfund Volume 1:			
*The lesser of the 95 % upper confidence limit (UCL) & maximum concentration. ND = Value and determined NE = Route not evaluated	Human Health Evaluation Manual Supplement	al Guidance Dermal Risk.	Assessment, 1998.			
	*The lesser of the 95 % upper confidence limit	(UCL) & maximum cond	centration.			
•	ND = Value not determined	VE = Route not evaluated				

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INCIDENTAL INGESTION OF AND DERMAL CONTACT WITH SUBSURFACE SOIL - RME
UNRESTRICTED LAND USE - ADULT RESIDENT
AOC 57 AREA 3 INDUSTRIAL
FORT DEVENS, MA

CARCINOGENIC EFFECTS

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PERCENT TOTAL RISK	83.19%			0.006%	0.0		0.5	9.0	15.5	
TOTAL HAZARD QUOTTENT	2.2E-02			.SE-06	1.3E-05		.4E-04	1.8E-04	4.0E-03	6.03
roj HAZ QUOT	2			-	_		_		4	
<u> </u>	2.7E-03			7.1E-07	5.0E-06		6.6E-05	8.3E-05	.9E-03	0.005
BAZARD QUOTIENT DERMAI	2			7	9		9	∞	-	
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HAZARD QEOTIENT INGESTION	1.9E-02			8.2E-07	6.8E-06		7.6E-05	9.7E-05	2.2E-03	0.02
HAZ QUO BAGE					•		•	٥.	.,	
DOSE Dermal mg/kg-day)	2.9E-04	2 N		5.5E-01	2.7E-02		5.5E-01	5.5E+00	2.7E-02	
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REFERÊNCE DOSE ORAL DERN (digrecta) (digre	3.0E-04	Q		6.0E-01	3.0E-02		6.0E-01	6.0E+00	3.0E-02	D INDE
REFF ORAL (mg/kg-da	3			v	6		•	9	60	HAZAR
A.L.	7.9E-07			3.9E-07	1.6E-07		3.6E-05	4.6E-04	5.1E-05	 SUMMARY HAZARD INDEX
INTAKE DERMAL (mg/kg-day)	7			m	-		٣	4	\$	SUM
ر د و د و	0.03	£		0.17	0.17		0.17	0.17	0.17	
DERMAL ABSORPTION EFFICIENCY										
	5.7E-06	3.8E-03		4.9E-07	2.1E-07	-	4.6E-05	5.8E-04	6.5E-05	_
INTAKE INGESTION (mg/kg-day)	5.71	3.8		4.9	2.11		4.6	5.8	6.5	
SOIL CONCENTRATEON (mg/kg)	6.67	6410		0.84	0.35		78	066	110	
SOIL NCENTRAT (mg/kg)										
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	Arsenic	Iron	VPH	C9-C12 Aliphatics	C9-C10 Aromatics	EPH	C9-C18 Aliphatics	C19-C36 Aliphatics	C11-C22 Aromatics	
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RES-SB31 INHALATION EXPOSURE TO PARTICULATES IN SUBSURFACE SOIL - RME UNRESTRICTED LAND USE - ADULT RESIDENT AOC 57 AREA 3 INDUSTRIAL FORT DEVENS, MA

EXPOSURE PARAMETERS

	mg/kg CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR (mg/kg-day)-1	ருர் ம	m² HAZARD QUOTIENT = INTAKE (mg/kg-day) / REFERENCE CONCENTRATION (mg/kg-day)	m³/kg		myhour INTAKE - INHALATION = ICAp + Cav) x RAF x IR x ET x ED	kg BW x AT x 365 days/yr	hours/day	days/year	years AIR CONCENTRATION PARTICULATES = CS x 1/PEF		AIR CONCENTRATION VOLATILES = CS x 1/VF	years (VF not calculated because there are no VOC's selected as CPCs).	years				
SYMBOL	CS See below	CAp Calculated	CAv Calculated	VF Calculated	PEF 1.32E+09	IhR 0.63	BW 70	ET 8	EF 150	ED 24	RAF 100%	-	AT 70	AT 24	confidence limit (UCL) & maximum concentrati	ial concern.		
PARAMETER	CONCENTRATION SOIL*	CONCENTRATION AIR PARTICULATES	CONCENTRATION AIR VOLATILES	VOLATILIZATION FACTOR**	PARTICULATE EMISSIONS FACTOR	INHALATION RATE	BODY WEIGHT	EXPOSURE TIME	EXPOSURE FREQUENCY	EXPOSURE DURATION	RELATIVE ABSORPTION FACTOR	AVERAGING TIME	CANCER	NONCANCER	Notes: * Soil concentration used is the lesser of the 95 % upper confidence limit (UCL) & maximum concentration	**Volatilization factor used only for volatile chemicals of potential concern.	For noncarcinogenic effects: AT = ED	

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INHALATION EXPOSURE TO PARTICULATES IN SUBSURFACE SOIL - RME
UNRESTRICTED LAND USE - ADULT RESIDENT
AOC 57 AREA 3 INDUSTRIAL
FORT DEVENS, MA

CARCINOGENIC EFFECTS

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RES-SB31
INCIDENTAL INGESTION OF AND DERMAL CONTACT WITH SUBSURFACE SOIL - RME
UNRESTRICTED LAND USE - CHILD RESIDENT (I TO 6 YEARS)
AOC 57 AREA 3 INDUSTRIAL
FORT DEVENS, MA

03-Feb-00

EXPOSURE PARAMETERS

PARAMETER	SYMBOL	VALUE	UNITS		
CONCENTRATION SOIL	SS	See Below*	mg/kg	CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR (mg/kg-day)-1	CER SLOPE FACTOR (mg/kg-day)-1
INGESTION RATE	Ħ	200	mg/day		
FRACTION INGESTED	E	100%		HAZARD QUOTIENT = INTAKE (mg/kg-day) / REFERENCE DOSE (mg/kg-day)	REFERENCE DOSE (mg/kg-day)
SOIL ADHERENCE FACTOR	SAF	-	mg/cm²		
SURFACE AREA EXPOSED	SA	2,045	cm³	INTAKE = (INTAKE-INGESTION) + (INTAKE-DERMAL)	-DERMAL)
CONVERSION FACTOR	ţ	0.000001	kg/mg		
BODY WEIGHT	BW	15	kg	INTAKE-INGESTION = CS x IR x FI x	CS x IR x FI x CF x EF x ED
EXPOSURE FREQUENCY	田	150	days/year	BWxATx	BW x AT x 365 days/yr
EXPOSURE DURATION	Œ	9	years		
AVERAGING TIME				$INTAKE-DERMAL = \frac{CS \times SA \times SAF \times AE \times CF \times EF \times ED}{CS \times SA \times SAF \times AE \times CF \times EF \times ED}$	E x CF x EF x ED
CANCER	AT	07	years	BWxATx	BW x AT x 365 days/yr
NONCANCER	AT	9	years		
DERMAL ABSORPTION	AE	Chemical-specific	unitless		
EFFICIENCY					
Notes:					
For noncarcinogenic effects: AT = ED					
The dermal absorption efficiency is from the Risk Assessment Guidance for Superfund Volume I:	isk Assessment Guidance 1	or Superfund Volume I:			
Human Health Evaluation Manual Supplemental	al Guidance Dermal Risk Assessment, 1998.	Assessment, 1998.			
*The lesser of the 95 % upper confidence limit (UCL) & maximum concentration.	(UCL) & maximum conc	entration.			
ND = Value not determined	NE = Route not evaluated				

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RES-SB31 INCIDENTAL INGESTION OF AND DERMAL CONTACT WITH SUBSURFACE SOIL - RME UNRESTRICTED LAND USE - CHILD RESIDENT (1 TO 6 YEARS) AOC 57 AREA 3 INDUSTRIAL FORT DEVENS, MA

CARCINOGENIC EFFECTS

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сомродир	SOIL CONCENTRATION (ing/kg)	INTAKE INGESTION (mg/kg-day)	DERMAL ABSORPTION RFRICERNCY	INTAKE DERMAL (mg/kg-day)	REFERÊNCE DOSE ORAL DERA	CE DOSE DERMAL (mg/kg-day)	HAZARD QUOTIENT INGESTION	BAZARD QUOTIENT DERMAL	TOTAL HAZARD QUOTTENT	PERCENT TOTAL RISK
Arsenic	19.6	5.3E-05	0.03	1.6E-05	3.0E-04	2.9E-04	1.8E-01	5.6E-02	2.3E-01	78.48%
Iron	6410	3.5E-02	QN		QN	QN.				
VPH										····
C9-C12 Aliphatics	0.84	4.6E-06	0.17	8.0E-06	6.0E-01	5.5E-01	7.7E-06	1.5E-05	2.2E-05	0.007%
C9-C10 Aromatics	0.35	1.9E-06	0.17	3.3E-06	3.0E-02	2.7E-02	6.4E-05	1.2E-04	1.9E-04	0.06%
EPH										
C9-C18 Aliphatics	78	4.3E-04	0.17	7.4E-04	6.0E-01	5.5E-01	7.1E-04	1.4E-03	2.1E-03	0.70%
C19-C36 Aliphatics	066	5.4E-03	0.17	9.4E-03	6.0E+00	5.5E+00	9.0E-04	1.7E-03	2.6E-03	0.88%
C11-C22 Aromatics	011	6.0E-04	0.17	1.0E-03	3.0E-02	2.7E-02	2.0E-02	3.9E-02	5.9E-02	19.87%
				SUMMARY	SUMMARY HAZARD INDEX	×	0.2	¥10	0.3	

RES-SB31
INHALATION EXPOSURE TO PARTICULATES IN SUBSURFACE SOIL - RME
UNRESTRICTED LAND USE - CHILD RESIDENT (1 TO 6 YEARS)
AOC 57 AREA 3 INDUSTRIAL
FORT DEVENS, MA

EXPOSURE PARAMETERS

PARAMETER:	SYMBOL	WALUE	SLINO	
CONCENTRATION SOIL*	SS	See below	mg/kg	CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR (mg/kg-day)-1
CONCENTRATION AIR PARTICULATES	CAp	Calculated	mg/m²	
CONCENTRATION AIR VOLATILES	CAv	Calculated	mg/m³	HAZARD QUOTIENT = INTAKE (mg/kg-day) / REFERENCE CONCENTRATION (mg/kg-day)
VOLATILIZATION FACTOR**	VF	Calculated	m³/kg	
PARTICULATE EMISSIONS FACTOR	PEF	1.32E+09	ug/m³	
INHALATION RATE	IhR	0.31	m³/hour	INTAKE - INHALATION = $(CAp + Cav) \times RAF \times IhR \times ET \times EF \times ED$
BODY WEIGHT	BW	15	kg	BW x AT x 365 daystyr
EXPOSURE TIME	ET	80	hours/day	
EXPOSURE FREQUENCY	H3	150	days/year	
EXPOSURE DURATION	ED	9	years	AIR CONCENTRATION PARTICULATES = CS x 1/PEF
RELATIVE ABSORPTION FACTOR	RAF	%001		!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
AVERAGING TIME				AIR CONCENTRATION VOLATILES = CS x 1/VF
CANCER	AT	70	years	(VF not calculated because there are no VOCs selected as CPCs).
NONCANCER	AT	9	years	
Notes: * Soil concentration used is the lesser of the 95 % upper confidence limit (UCL) & maximum concentration	r confidence limit (UCL) &	maximum concentration		
**Volatilization factor used only for volatile chemicals of potential concern.	tial concern.			
For noncarcinogenic effects: AT = BD				
ND = Value not determined				

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RES-SB31
INHALATION EXPOSURE TO PARTICULATES IN SUBSURFACE SOIL - RME
UNRESTRICTED LAND USE - CHILD RESIDENT (1 TO 6 YEARS)
AOC 57 AREA 3 INDUSTRIAL
FORT DEVENS, MA

CARCINOGENIC EFFECTS

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Arsenic Ansenic NA 7.3E-09 5.0E-10 ND ND Assent ND <th< th=""><th>COMPOUND</th><th>CONCENTRATION (mg/kg)</th><th>VF (m)/kg)</th><th>VOLATBES (mg/m²)</th><th>PARTICULATES (mg/m²) (m</th><th>INTAKE (mg/kg-da).]</th><th>DOSE (mg/kg-day)</th><th>BAZAND QUOTIENT</th><th>TOTAL</th></th<>	COMPOUND	CONCENTRATION (mg/kg)	VF (m)/kg)	VOLATBES (mg/m²)	PARTICULATES (mg/m²) (m	INTAKE (mg/kg-da).]	DOSE (mg/kg-day)	BAZAND QUOTIENT	TOTAL
6410 NA 4.9E-06 3.3E-07 ND ND NS NS NS NS NS NS NS NS NS NS NS NS NS	nic	19.6	NA		7.3E-09	5.0E-10	ND		
0.84 NA 6.4E-10 4.3E-11 5.7E-01 7.6E-11 7.6E-11 7.6E-11 7.6E-11 1.7E-02 1.1E-09 7.8E-01 7.5E-01 7.6E-11 1.7E-02 1.1E-09 7.5E-01 7.5E-01 7.6E-09 7.5E-07 7.5E-07 7.5E-07 7.5E-07 7.5E-09 7.7E-09 7.5E-07 7.5E-09 7.7E-0		6410			4.9E-06	3.3E-07	QN		
0.84 NA 6.4E-10 4.3E-11 5.7E-01 7.6E-1									
0.35 NA 2.7E-10 1.8E-11 1.7E-02 1.1E-09 1.1E-0	312 Aliphatics	0.84	AN		6.4E-10	4.3E-11	5.7E-01	7.6E-11	0.03%
78 NA 5.9E-08 4.0E-09 5.7E-01 7.0E-09 990 NA 7.5E-07 5.1E-08 ND 110 NA 8.3E-08 5.7E-09 2.0E-02 2.8E-07 9	210 Aronatics	0.35	NA		2.7E-10	1.8E-11	1.7E-02	1.1E-09	0.36%
78 NA 5.9E-08 4.0E-09 5.7E-01 7.0E-09 990 NA 7.5E-07 5.1E-08 ND 110 NA 8.3E-08 5.7E-09 2.0E-09 2.8E-07 9									
990 NA 7.5E-07 5.1E-08 ND 110 NA 8.3E-08 5.7E-09 2.0E-02 2.8E-07	318 Aliphatics	78	NA NA		5.9E-08	4.0E-09	5.7E-01	7.0E-09	2.42%
110 NA 8.3E-08 5.7E-09 2.0E-02 2.8E-07	C36 Aliphatics	066	NA		7.5E-07	5.1E-08	ND		
	C22 Aromatics	011	NA		8.3E-08	5.7E-09	2.0E-02	2.8E-07	97.19%

RES-CW2I.
INGESTION OF GROUNDWATER AS DRINKING WATER (UNFILTERED SAMPLES) - RME
UNRESTRICTED LAND USE - ADULT RESIDENT
AOC 57 AREA 3 INDUSTRIAL
FORT DEVENS, MA

EXPOSURE PARAMETERS

CONCENTRATION WATER	CW	chemical-specific	ng/liter	CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR (mg/kg-day)-1
INGESTION RATE	X	2	liters/day	
BODY WEIGHT	BW	70	gy	HAZARD QUOITIENT = INTAKE (mg/kg-day) / REFERENCE DOSE (mg/kg-day)
CONVERSION FACTOR	ъ	0.001	Sn/Sm	-
EXPOSURE FREQUENCY	6	350	days/year	
EXPOSURE DURATION	g	30	years	INTAKE = CWXIRXEFXEDXCF
AVERAGING TIME				BW x AT x 365 days/year
CANCER	TA	70	years	
NONCANCER	AT	30	years	

RES-CW21
INGESTION OF GROUNDWATER AS DRINKING WATER (UNFILTERED SAMPLES) - RME
UNRESTRICTED LAND USE - ADULT RESIDENT
AOC 57 AREA 3 INDUSTRIAL
FORT DEVENS, MA

CARCINOGENIC EFFECTS

Arealic COMPENTRATION Inight-Libr) PRECTOR INGESTION Arealic Arealic 33.2 g/Liter 3.9E-04 1.5E+00 5.8E-04 Cadmium 1.4-Dichloroberuzane 3.6 g/Liter 1.0E-04 ND 1.6E-06 Naphthalene 2.0 ug/Liter 2.3E-04 ND 1.6E-06 Chloroberuzane 4.5 ug/Liter 2.3E-04 ND 6.9E-06 Chloroberuzane 4.5 ug/Liter 5.3E-04 ND 6.9E-06 Chloroberuzane 1.0 ug/Liter 5.3E-04 ND 6.9E-06 Telronoberuzane 2.6 ug/Liter 3.1E-04 6.1E-03 7.2E-07	CONCENTRATION STACESTION PACTOR INSERTION IN		WATER	CNITS	INTAKE	CANCERSLOPE	CANCER RISK
cenzene 3.3.2 lug/Liler 3.9E-04 1.5E+00 8.67 lug/Liler 1.0E-04 ND 5.6 ug/Liler 6.6E-03 2.4E-02 chloride 4.5 ug/Liler 2.3E-04 ND chloride 4.5 ug/Liler 5.2E-01 1.2E-01 lug/Liler 3.1E-05 6.1E-03 5.2E-02	Sample S	COMPOUND	CONCENTRATION		ENGESTION (mg/kg-day)	RACTOR Gug/kg-dayy-1	INGESTION
secure 3.67 lug/Lier 1.0E-04 ND central 5.6 ug/Lier 6.6E-05 2.4E-02 colloride 4.5 ug/Lier 3.3E-04 ND colloride 1.0 ug/Lier 1.2E-01 6.1E-01 lene 2.6 ug/Lier 3.1E-05 5.2E-02	So lugitier 1.0E-04 ND	resente	33.2	lug/Liter	3.9E-04	1.5E+00	5.8E-04
enzene 5.6 lug/Lider 6.6E-05 2.4E-02 20 lug/Lider 2.3E-04 ND 4.5 lug/Lider 5.3E-05 1.3E-01 10 lug/Lider 1.2E-04 6.1E-03 2.6 lug/Lider 3.1E-05 5.2E-02	setazone \$6 lug/Lier 6.6E-05 2.4E-02 20 ug/Lier 2.3E-04 ND chloride 45 ug/Lier 5.3E-05 1.3E-01 10 ug/Lier 1.2E-04 6.1E-03 hene 2.6 ug/Lier 3.1E-05 5.2E-02	adnium	3.67	ug/Liter	1.0E-04	QX	
20 ug/Lier 2.3E-04 ND 4.5 ug/Lier 5.3E-05 1.3E-01 10 ug/Lier 1.2E-04 6.1E-03 here 2.6 ug/Lier 3.1E-05 5.2E-02	20 ug/Lider 2.3E-04 ND 4.5 ug/Lider 5.3E-05 1.3E-01 10 ug/Lider 1.2E-04 6.1E-03 hene 2.6 ug/Lider 3.1E-05	4-Dichlorobenzene	5.6	ug/Liter	6.6E-05	2.4E-02	1.6E-06
thoride 4.5 ug/Lier 5.3E-05 1.3E-01 1.3E-04 6.1E-03 1.2E-04 6.1E-03 1.2E-04 6.1E-03 1.2E-05 5.2E-02 1.2E-05 1.2E-04 1.3E-05 1.2E-04 1.3E-05 1.2E-05 1.3E-05 1.	chloride 4.5 kg/Liter 5.3E-05 1.3E-01 10 kg/Liter 1.2E-04 6.1E-03 hene 2.6 kg/Liter 3.1E-05 5.2E-02	annthalene	30	ug/Liter	2.3E-04	QN	
10 ug/Liter 1.2E-04 6.1E-03 5.2E-02 5.0 ug/Liter 3.1E-05 5.2E-02	10 ug/Liter 1.2E-04 6.1E-03 hene 2.6 ug/Liter 3.1E-05 5.2E-02	arbon Tetrachloride	A.	ug/Liter	5.3E-05	1.3E-01	6.9E-06
2.6 lug/Lider 3.1E-05 5.2E-02	hene 3.1E-05 5.2E-02	hlorofoem	01	ng/Liter	1.25-04	6.1E-03	7.2E-07
		etrachloroethene	2.6	ug/Liter	3.15-05	5.2E-02	1.6E-06

Aluminum	061	190 ug/Liter	5.2E-03	1.0E+00	5.2E-03
Arsenic	33.2	33.2 ug/Liter	9.1E-04	3.06-04	3.0E+00
Cadmium	8.67	8.67 ug/Liter	2.46-04	5.0E-04	4.8E-01
Iron	12400	12400 ug/Liter	3.46-01	GZ.	
Manganese	166	466 ug/Liter	1.3E-02	2.46-02	5.3E-01
1.2-Dichlorobenzene	8.6	9.8 ug/Liter	2.7E-04	9.0E-02	3.0E-03
1.4-Dichlorobenzene	5.6	5.6 ug/Liter	1.5E-04	3.0E-02	5.1E-03
Naphthalene	30	20 ug/Liter	5.5E-04	2.0E-02	2.7E-02
Carbon Tetrachloride	4.5	4.5 ug/Liter	1.2E-04	7.06-04	1.8E-01
Chloroform	2	10 ug/Liter	2.7E-04	1.0E-02	2.7E-02
Tetrachlene	2.6	2.6 ug/Liter	7.1E-05	1.06-02	7.16-03
C9-C10 Aromatics	310	310 ug/Liter	8.5E-03	3.0E-02	2.8E-01

RECCH-SS3R INCIDENTAL INGESTION OF AND DERMAL CONTACT WITH SURFACE SOIL - RME CURRENT/FUTURE RECREATIONAL CHILD (6 TO 16 YEARS) AOC 57 AREA 3 RECREATIONAL FORT DEVENS, MA

14-Mar-00

EXPOSURE PARAMETERS

PARAMETER	SYMBOL	VALUE	UNITS	
CONCENTRATION SOIL	CS	Sec Below*	mg/kg	CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR (mg/kg-day)-1
INGESTION RATE	R	001	mg/day	
FRACTION INGESTED	E	%001		HAZARD QUOTIENT = INTAKE (mg/kg-day) / REFERENCE DOSE (mg/kg-day)
SOIL ADHERENCE FACTOR	SAF		mg/cm³	
SURFACE AREA EXPOSED	SA	3,850	cm²	INTAKE = (INTAKE-INGESTION) + (INTAKE-DERMAL)
CONVERSION FACTOR	ម	0,000001	kg/mg	
BODY WEIGHT	BW	38		INTAKE-INGESTION = CS x IR x FI x CF x EF x ED
EXPOSURE FREQUENCY	EF	S.	·	BW x AT x 365 days/yr
EXPOSURE DURATION	Œ	=	years	
AVERAGING TIME				$NTAKE-DERMAL = CS \times SA \times SAF \times AE \times CF \times EF \times ED$
CANCER	AT	70	years	BW x AT x 365 days/yr
NONCANCER	AT	=	years	
DERMAL ABSORPTION	AE	Chemical-specific	unitless	
EFEICIENCY				
Notes:				
For noncarcinogenic effects: AT = ED				
The dermal absorption efficiency is from the Risk Assessment Guidance for Superfund Volume I:	isk Assessment Guidance	for Superfund Volume I:		
Human Health Evaluation Manual Supplemental Guidance Dermal Risk Assessment, 1998.	al Guidance Dermal Risk	Assessment, 1998.		
*The lesser of the 95 % upper confidence limit	(UCL) & maximum concentration.	entration.		
ND = Value not determined				

RECCH-SS3R INCIDENTAL INGESTION OF AND DERMAL CONTACT WITH SURFACE SOIL - RME CURRENT/FUTURE RECREATIONAL CHILD (6 TO 16 YEARS) AOC 57 AREA 3 RECREATIONAL FORT DEVENS, MA

CARCINOGENIC EFFECTS

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CANCER SLC ORAL (mg/kg-day)-1	1.5E+00	1.6E+01		IЮ
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INTAKE DERMAL (mg/kg-day)	1.9E-06	0.0E+00		
STAKE ERMA g/kg-dn	9	8		
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DERMAL ABSORPTION EFFICIENCY	0.03	2		
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NONCARCINOGENIC EFFECTS

PERCENT TOTAL RISK	15.81%	0.18%	0.22%	Ì	1.57%	12.77%		1.36%	2.09%	%66'59	
TOTAL HAZARD QUOTTENT	7.7E-02	9.0E-04	1.0E-03		7.6E-03	6.2E-02		6.6E-03	1.0E-02	3.2E-01	
HAZARD QUOTIENT DERMAL	4.2E-02				6.7E-03	5.5E-02		5.8E-03	8.9E-03	2.8E-01	
HAZARD QUOTIENT INGESTION	3.5E-02	9.0E-04	1.0E-03		9.4E-04	7.5E-03	<u>.</u>	8.1E-04	1.2E-03	3.9E-02	
E DOSE DERMAL (mg/kg-day)	2.9E-04	Q	QN		5.5E-01	2.7E-02		5.5E-01	5.5E+00	2.7E-02	
REFERÊNCE DOSE ORAL DERM (mg/kg-day) (mg/kg	3.0E-04	7.1E-02	5.0E-05		6.0E-01	3.0E-02		6.0E-01	6.0E+00	3.0E-02	
INTAKE DERMAL (ng/kg-day)	1.2E-05				3.7E-03	1.5E-03		3.2E-03	4.9E-02	7.6E-03	
DERMAL ABSORPTION EFFICIENCY	0.03	QN	QN		0.17	0.17		0.17	0.17	0.17	
INGESTION (mg/kg-day)	1.0E-05	6.4E-05	5.2E-08		5.6E-04	2.2E-04		4.9E-04	7.5E-03	1.2E-03	
SOIL CONCENTRATION (mg/kg)	28	170	0.14		1500	009		1300	20,000	3100	
COMPOUND	Arsenic	Manganese	Dieldrin	HdV	C9-C12 Aliphatics	C9-C10 Aromatics	ЕРН	C9-C18 Aliphatics	C19-C36 Aliphatics	C11-C22 Aronatics	

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INCIDENTAL INGESTION OF AND DERMAL CONTACT WITH SEDIMENT - RME CURRENT/FUTURE RECREATIONAL CHILD (6-16 YEARS) AOC 57 AREA 3 RECREATIONAL FORT DEVENS, MA RECCH-SD3R

14-Mar-00

EXPOSURE PARAMETERS

PARAMETER	SYMBOL	WALUE	UNITS		
CONCENTRATION SEDIMENT	SS	See Below*	mg/kg	CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR (mg/kg-day)-1	E FACTOR (mg/kg-day)-1
INGESTION RATE	Ж	25	mg/day		
FRACTION INGESTED	Ħ	100%		HAZARD QUOTIENT = INTAKE (mg/kg-day) / REFERENCE DOSE (mg/kg-day)	CE DOSE (mg/kg-day)
SOIL ADHERENCE FACTOR	SAF		mg/cm²		
SURFACE AREA EXPOSED	SA	3,850	cm³	INTAKE = (INTAKE-INGESTION) + (INTAKE-DERMAL)	
CONVERSION FACTOR	ង	0.000001	kg/mg		
BODY WEIGHT	BW	38	kg	INTAKE-INGESTION = CS x IR x F1 x CF x EF x ED	a
EXPOSURE FREQUENCY	ВF	52	days/year	BW x AT x 365 days/yr	
EXPOSURE DURATION	æ	=	years		
AVERAGING TIME				$CS \times SA \times SAF \times AE \times CF \times ED$	FXED
CANCER	AT	70	years	BW x AT x 365 days/yr	
NONCANCER	AT	=	years	-	
DERMAL ABSORPTION	AE	Chemical-specific	unitless		
EFFICIENCY					
Notes:					
For noncarcinogenic effects: AT = ED					
The dermal absorption efficiency is from the Risk Assessment Guidance for Superfund Volume I:	tisk Assessment Guidance	for Superfund Volume I:			
Human Health Evaluation Manual Supplemental Guidance Dermal Risk Assessment, 1998.	tal Guidance Dermal Risk	Assessment, 1998.			
*The lesser of the 95 % upper confidence limit (UCL) & maximum concentration.	it (UCL) & maximum cone	centration.			
ND = Value not determined					

RECCH-SD3R
INCIDENTAL INGESTION OF AND DERMAL CONTACT WITH SEDIMENT - RME
CURRENT/FUTURE RECREATIONAL CHILD (6-16 YEARS)
AOC 57 AREA 3 RECREATIONAL
FORT DEVENS, MA

CARCINOGENIC EFFECTS

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2	87.51% 12.49%	
PERCENT TOTAL RISK	2.4	
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TOTAL CANCER RISK	4.0	
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INTAKE Dermal mg/kg-day)	2.7E-07	
INTAKE PERMAL rg/kg-dny)	.7E	
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COMPOUND	SEDIMENT CONCENTRATION (mg/kg)	INTAKE INGESTION (ong/kg-day)	DERMAL ABSORPTION EFFICIENCY	INTAKE DERMAL (mg/kg-dry)	REFERENCE DOSE ORAL DERM (mg/kg-day) (ng/kg	CE DOSE DERMAL (ng/kg-day)	HAZARD QUOTIENT INGESTION	HAZARD QUOTIENT DERMAL	TOTAL HAZARD QUOTTENT	PERCENT TOTAL RISK
Arsenio	37	3.5E-06	0.03	1.6E-05	3.0E-04	2.9E-04	1.2E-02	5.5E-02	6.7E-02	48.47%
Maneanese	459	4.3E-05	QN		7.1E-02	4.3E-03	6.1E-04	0.0E+00	6.1E-04	0.44%
Aroclor-1260	0.84	7.9E-08	0.14	1.7E-06	2.0E-05	1.6E-05	3.9E-03	1.1E-01	1.1E-01	79.83%
EPH Fractions	280	2.6E-05	0.17	6.9E-04	3.0E-02	2.7E-02	8.7E-04	2.5E-02	2.6E-02	19.10%
C19-C36 Aliphatics	630		0.17	1.5E-03	6.0E+00	5.5E+00	9.8E-06	2.8E-04	2.9E-04	0.211%
VPH Fractions		3 15-07	0.17	8.1E-06	6.0E-02	5.5E-02	5.2E-06	1.5E-04	1.5E-04	0.111%
C9-C10 Aromatics	4.3		0.17	1.1E-05		2.7E-02	1.3E-05	3.9E-04	4.0E-04	0.293%
C9-C12 Aliphatics	5.6	5.2E-07	0.17	1.4E-05	6.0E-01	5.5E-01	8.7E-07	2.5E-05	2.6E-05	0.0188%
				SUMMARY	SUMMARY HAZARD INDEX	X	0.01	£(0)	0.1	



RECCH-SW3R

INCIDENTAL INGESTION OF AND DERMAL CONTACT WITH SURFACE WATER - RME CURRENT/FUTURE RECREATIONAL CHILD (6-16 YEARS)

AOC 57 AREA 3 RECREATIONAL FORT DEVENS, MA EXPOSURE PARAMETERS

PARAMETER	SYMBOL	VALUE	UNITS			
CONCENTRATION WATER	CW	average	mg/liter	CANCER RISK = INTAKE (mg/kg-da)	CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR (mg/kg-day) ⁻¹	
INGESTION RATE	Ħ	0.013	liters/hour			
SURFACE AREA EXPOSED	SA	2,518	cm²/day	HAZARD QUOTIENT = INTAKE (mg/	HAZARD QUOTIENT = INTAKE (mg/kg-day) / REFERENCE DOSE (mg/kg-day)	
CONVERSION FACTOR	ይ	0.001	liter/cm ³			
BODY WEIGHT	BW	38	kg	INTAKE = (INTAKE-INGESTION) + (INTAKE-DERMAL)	INTAKE-DERMAL)	
EXPOSURE TIME	터	2	hours/day			
EXPOSURE FREQUENCY	3E	52	days/year	INTAKE-INGESTION = CV	CW x IR x ET x EF x ED	
EXPOSURE DURATION	ED	=	years		BW x AT x 365 days/yr	
AVERAGING TIME					1	
CANCER	AT	70	years	INTAKE-DERMAL = CW x Kpe	CW x Kpevent x ET xSA x CF x EF x ED	
NONCANCER	AT	=	years	M	BW x AT x 365 days/yr	
PERMEABILITY COEFFICIENT	Kpevent	Chemical-specific	cm/day			
Notes:						
For noncarcinogenic effects: AT = ED						
ND - Value not determined						
TPHC - Total Petroleum Hydrocarbons						

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RECCH-SW3R

INCIDENTAL INGESTION OF AND DERMAL CONTACT WITH SURFACE WATER - RME
CURRENT/FUTURE RECREATIONAL CHILD (6-16 YEARS)
AOC 57 AREA 3 RECREATIONAL
FORT DEVENS, MA
CARCINOGENIC EFFECTS

PERCENT TOTAL RISK	6.10%	
ERCENT TOTAL RISK	3.9	
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TOTAL CANCER RISK	4.2E-06	ü
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INTAKE DERMAL Mg/kg-day	ந் ந்	
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7 1.0E-03 1.1E-07 4.0E-04 6.0E-05 1.36E-03 1.76E-03 3.1E-03 3.1E-03 3.1E-03 3.1E-03 3.1E-03 3.1E-03 3.1E-03 3.1E-03 3.1E-03 3.1E-03 3.1E-03 3.1E-03 3.1E-03 3.1E-03 3.1E-03 3.1E-03 3.1E-03 3.1E-03 3.1E-03 4.9E-03 3.8E-04 4.9TE-03 3.7E-04 1.07E-03 1.5E-03 1.6E-03	gnioawa:	WATER CONCENTRATION (mg/L)	INTAKE INGESTION (mg/kg-day)	PERMEABILITY COSFFICIENT (cm/hour)	INTAKE DERMAL (mg/kg-day)	REFERENCE DOSE ORAL (mg/kg-443/) (mg/kg-43/)	(CE DOSE DERMAL (mg/kg-day)	HAZARD QUOTIENT INGESTION	HAZARD QUOTIENT DERMAL	TOTAL HAZARO QUOTIENT	PERCENT TOTAL RISK
cse 1.5E-05 1.0E-03 2.9E-06 3.0E-04 4.9TE-02 4.9TE-02 9.96E-03 6.0E-02 8 cse 0.278 2.7E-05 1.0E-03 5.2E-06 7.0E-02 4.9E-03 3.8TE-04 4.9TE-02 1.0TE-03 1.5E-03 cse 0.093 9.1E-06 1.0E-03 1.8E-06 7.0E-02 1.4E-03 3.8TE-04 1.0TE-03 1.5E-03 plunoranthene 0.00094 9.2E-08 1.2E+00 1.8E-06 2.7E-02 1.4E-03 3.78E-04 1.25E-03 1.6E-03 A roundics 0.63 6.3E-08 NA 3.0E-02 2.7E-02 2.1E-03 3.78E-04 1.25E-03 1.6E-03 A roundics 1.1 1.1E-04 NA 3.0E-02 2.7E-02 2.1E-03 3.1E-03 1.8E-05 A roundics 0.025 2.4E-06 NA 3.0E-02 2.7E-02 8.12E-05 8.1E-05 9.6E-03	Antimony	0.0056	,	1.0E-03	1.1E-07	4.0E-04	6.0E-05	1.36E-03	1.76E-03	3.1E-03	4.59%
cse 0.278 2.7E-05 1.0E-03 5.2E-06 7.0E-02 4.9E-03 3.87E-04 1.07E-03 1.5E-03 cse 0.093 9.1E-06 1.0E-03 1.8E-06 7.0E-02 1.4E-03 3.78E-04 1.07E-03 1.6E-03 Olumenanthene 0.00094 9.2E-08 1.2E+00 1.2E+00 NA 3.0E-02 2.7E-02 2.11E-03 1.6E-03 1.6E-03 A roundics 1.1 1.1E-04 NA 3.0E-02 2.7E-02 2.11E-03 1.79E-05 1.8E-05 A roundics 0.025 2.4E-06 NA 3.0E-02 2.7E-02 8.12E-05 8.1E-05	Arsenic	0,153	-	1.0E-03	2.9E-06	3.0E-04	2.9E-04	4.97E-02	9.96E-03	6.0E-02	87.62%
ese 0.093 9.1E-06 1.0E-03 1.8E-06 2.4E-02 1.4E-03 3.78E-04 1.25E-03 1.6E-03 Olunoranthene octions actions actions actions actions 0.00094 9.2E-08 1.2E+00 1.8E-06 1.2E-02 2.7E-02 2.11E-03 1.6E-03 1.6E-03 1.6E-03 1.6E-03 1.8E-05 1.8E-05 1.8E-05 1.8E-05 1.8E-05 1.8E-05 1.8E-05 1.8E-05 8.1E-05 8.1E-05	Barium	0.278	2	1.0E-03	5.2E-06	7.0E-02	4.9E-03	3.87E-04	1.07E-03	1.5E-03	2.14%
0.00094 9.2E-08 1.2E+00 ND ND ND 2.1E-03 0.65 6.3E-05 NA 3.0E-02 2.7E-02 2.11E-03 2.1E-03 1.1 1.1E-04 NA 6.0E+00 5.5E+00 1.79E-05 1.8E-05 0.025 2.4E-06 NA 3.0E-02 2.7E-02 8.12E-05 8.1E-05	Manganese	0.093	6	1.0E-03	1.8E-06	2.4E-02	1.4E-03	3.78E-04	1.25E-03	1.6E-03	2.40%
0.65 6.3E-05 NA 3.0E-02 2.7E-02 2.11E-03 2.1E-03 1.8E-05 1.1E-04 NA 6.0E+00 5.5E+00 1.79E-05 1.8E-05 0.025 2.4E-06 NA 3.0E-02 2.7E-02 8.12E-05 8.1E-05	Benzo(k)fluoranthene	0.00094	9.2E-08	1.2E+00		QN					
0.025 2.4E-06 NA 6.0E-02 2.7E-02 1.79E-05 1.8E-05 0 1.8E-05 0 1.0E-05 0 1.0E-05 0 1.8E	EPH Fractions		50	7		2000	2 75-02	2 11E-03		2 1E-03	3.10%
0.025 2.4E-06 NA 3.0E-02 8.12E-05 8.1E-05	C10-C22 Aromatics	0.65	0.3E-03	K K		5.0E-02	5.5E+00	1.79E-05		1.8E-05	0.026%
ities 0.025 2.4E-06 NA 3.0E-02 2.7E-02 8.12E-05 8.1E-05	VPH Fractions										
	C9-C10 Aromatics	0.025	2	Ϋ́		3.0E-02	2.7E-02	8.12E-05		8.1E-05	0.12%

RECCH-SS3R(CT)
INCIDENTAL INGESTION OF AND DERMAL CONTACT WITH SURFACE SOIL - CENTRAL TENDENCY
CURRENT/FUTURE RECREATIONAL CHILD (6 TO 16 YEARS)
AOC 57 AREA 3 RECREATIONAL
FORT DEVENS, MA

14-Mar-00

EXPOSURE PARAMETERS

PARAMETER	SYMBOL	VALUE	UNITS	
CONCENTRATION SOIL.	S	See Below*	mg/kg	CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR (mg/kg-day)-1
INGESTION RATE	띪	20	mg/day	
FRACTION INGESTED	E	%001		HAZARD QUOTIENT = INTAKE (mg/kg-day) / REFERENCE DOSE (mg/kg-day)
SOIL ADHERENCE FACTOR	SAF		mg/cm²	
SURFACE AREA EXPOSED	SA	3,850	cm³	INTAKE = (INTAKE-INGESTION) + (INTAKE-DERMAL)
CONVERSION FACTOR	CF	0.000001	kg/mg	
BODY WEIGHT	BW	38	kg	INTAKE-INGESTION - CS x IR x F1 x CF x EF x ED
EXPOSURE FREQUENCY	EF	26	days/year	BW x AT x 365 days/yr
EXPOSURE DURATION	8	=	years	
AVERAGING TIME				INTAKE-DERMAL $=$ $CS \times SA \times SAF \times AE \times CF \times EF \times ED$
CANCER	AT	70	years	BW x AT x 365 days/yr
NONCANCER	AT	Ξ	years	
DERMAL ABSORPTION	AE	Chemical-specific	unitless	
EFFICIENCY				
Notes:				
For noncarcinogenic effects: AT = ED				
The dermal absorption efficiency is from the Risk Assessment Guidance for Superfund Volume I:	sk Assessment Guidance	for Superfund Volume I:		
Human Health Evaluation Manual Supplemental Guidance Dermal Risk Assessment, 1998.	al Guidance Dermal Risk	Assessment, 1998.		
*The lesser of the 95 % upper confidence limit (UCL) & maximum concentration.	(UCL) & maximum con	centration.		
ND = Value not determined				

RECCH-SS3R(CT)
INCIDENTAL INGESTION OF AND DERMAL CONTACT WITH SURFACE SOIL - CENTRAL TENDENCY
CURRENT/FUTURE RECREATIONAL CHILD (6 TO 16 YEARS)
AOC 57 AREA 3 RECREATIONAL
FORT DEVENS, MA

CARCINOGENIC EFFECTS

£	100.00%	
ERCENT TOTAL RISK	8	
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INTAKE DERNAL (mg/kg-day)	0	
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SOIL ENTRATION (mg/kg)	28 0.14	
SOIL INCENTRATION (mg/kg)	0.14	
SOIL CONCENTRATION (mg/kg)	28	
SOIL CONCENTRATION (mg/kg)	28	
SQIL. CONCENTRATION (mg/kg)	0.14	
SQUENCENTRATFON CONCENTRATFON	0.14	
SOIL CONCENTRATION (mg/kg)	0.14	
SOIL. CONCENTRATION (mg/kg)	28	
SQUL. D CONCENTRATION (mg/kg)	0.14	
SOIL. IND CONCENTRATION (mg/kg)	0.14	
SOIL COUND CONCENTRATION (mg/s)	0.14	
SOIL. SOIL CONCENTRATION (ING/E)	28	
SOMPOUND SOIL.	0.14	
SOIL SOIL COMPOUND CONCENTRATION (mg/kg)	0.14	
SOIL COMPOUND CONCENTRATION (INEVES)	Ö	
SOIL. COMPOUND CONCENTRATION (INEVE)	Ö	
XOMPOLIND CONCENTRATION (INPUR)	Arsenic 28 Dieldrin 0.14	

COMPOUND	SOIL. CONCENTRATION (mg/kg)	INTAKE INGESTION (mg/kg-day)	DERMAL ABSORPTION EPFICENCY	INTAKE BERMAL (ngkgddy)	REFERENCE DOSE ORAL DERM (mg/kg-day) (mg/kg-	E DOSE DERMAL (mg/kg-day)	HAZARD QUOTIENT INGESTION	KAZARD QUOTIENT DERMAL	TOTAL HAZARD QUOTEENT	PERCENT TOTAL RISK
Arsenic	28		0.03	6.1E-06	3.0E-04	2.9E-04	8.7E-03	2.1E-02	3.0E-02	13.40%
Manganese	170	1.6E-05	Q		7.1E-02	Ω	2.2E-04		2.2E-04	0.10%
Dieldrin	0.14	1.3E-08	QN		5.0E-05	QN	2.6E-04		2.6E-04	0.12%
<u>VPH</u>										
C9-C12 Aliphatics	1500	1.4E-04	0.17	1.8E-03	6.0E-01	5.5E-01	2.3E-04	3.3E-03	3.6E-03	1.62%
C9-C10 Aronatics	009	5.6E-05	0.17	7.4E-04	3.0E-02	2.7E-02	1.9E-03	2.7E-02	2.9E-02	13.17%
EPH						,	!		1	,
C9-C18 Aliphatics	1300	1.2E-04	0.17	1.6E-03	6.0E-01	5.5E-01	2.0E-04	2.9E-03	3.1E-03	1.40%
C19-C36 Aliphatics	20,000	1.9E-03	0.17	2.5E-02	6.0E+00	5.5E+00	3.1E-04	4.5E-03	4.8E-03	2.16%
C11-C22 Aromatics	3100	2.9E-04	0.17	3.8E-03	3.0E-02	2.7E-02	9.7E-03	1.4E-01	1.5E-01	68.03%
				SUMMARY	SUMMARY HAZARD INDEX	X	0.02	Z:0:::::::::::::::::::::::::::::::::::	0.2	

RECCH-SD3R
INCIDENTAL INGESTION OF AND DERMAL CONTACT WITH SEDIMENT - CENTRAL TENDENCY
CURRENT/FUTURE RECREATIONAL CHILD (6-16 YEARS)
AOC 57 AREA 3 RECREATIONAL
FORT DEVENS, MA

14-Mar-00

EXPOSURE PARAMETERS

PARAMERE	TORWAS	VALUE	UNITS		
CONCENTRATION SEDIMENT	CS	See Below*	mg/kg	CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR (mg/kg-day)-1	SLOPE FACTOR (mg/kg-day)-1
INGESTION RATE	R	25	mg/day		
FRACTION INGESTED	E	%001		HAZARD QUOTIENT = INTAKE (mg/kg-day) / REFERENCE DOSE (mg/kg-day)	ERENCE DOSE (mg/kg-day)
SOIL ADHERENCE FACTOR	SAF		mg/cm²		
SURFACE AREA EXPOSED	SA	3,850	Cult ₁	INTAKE = (INTAKE-INGESTION) + (INTAKE-DERMAL)	(MAL)
CONVERSION FACTOR	ភ	0.000001	kg/mg		
BODY WEIGHT	BW	38	kg	INTAKE-INGESTION = CS x IR x F1 x CF x EF x ED	EF x ED
EXPOSURE FREQUENCY	田	26	days/year	BW x AT x 365 days/yr	ays/yr
EXPOSURE DURATION	BD	=	years		
AVERAGING TIME				INTAKE-DERMAL = CS x SA x SAF x AE x CF x EF x ED	Fx EFx ED
CANCER	ΑT	70	years	BW x AT x 365 days/yr	ays/yr
NONCANCER	AT	-	years		
DERMAL ABSORPTION	ΑĒ	Chemical-specific	unitless		
EFFICIENCY					
Notes:					
For noncarcinogenic effects: AT = ED					
The dermal absorption efficiency is from the Risk	Risk Assessment Guidance	Assessment Guidance for Superfund Volume I:		• .	
Human Health Evaluation Manual Supplemental Guidance Dermal Risk Assessment, 1998.	ntal Guidance Dermal Risk	: Assessment, 1998.			
*The lesser of the 95 % upper confidence limit (L	it (UCL) & maximum concentration.	centration.			
ND = Value not determined					

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RECCH-SD3R .
INCIDENTAL INGESTION OF AND DERMAL CONTACT WITH SEDIMENT - CENTRAL TENDENCY
CURRENT/FUTURE RECREATIONAL CHILD (6-16 YEARS)
AOC 57 AREA 3 RECREATIONAL
FORT DEVENS, MA

CARCINOGENIC EFFECTS

ERCENT TOTAL RISK		
ERCENT TOTAL RISK	12.49%	
N O N	12	
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	3.5E-07	3E-06
TOTAL CANCER RISK	1	汉
TOTAL CANCER RISK	3.5	
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LOPE FACTIOR CANCER RISK DEXMAL ROCESTION (migre-cay)-1	1.6E+00 2.5E+00	
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F & L	2.5	≥
FACTOR DERMAL mg/kg-(ay)		씂
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CANCER SLOPE FACTOR ORAL (mg/kg-day)-1 (mg/kg-day)-1	0 0	1
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CANCER ORAL (mg/kg-day)	2.01	≅
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DERMAL INTAKE ABSORPTION DERMAL EFFICIENCY (ng/g-dby)	1.3E-06 1.3E-07	
INTAKE DERMAL mg/kg-day)	.3E-06 .3E-07	
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DERMAL ABSORPTION BFEICIENCY	Ε 4	
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DERMAL BSORPTION FEICTENCY		
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	Arsenic Araclor-1260	
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Arsenic 37 Manganese 459 Aroclor-1260 0.84	1.7E-06 2.2E-05 3.9E-08	0.03 8.0E-06				TOWNS A	QUOTIENT	
	2.2E-05 3.9E-08		.06 3.0E-04	2.9E-04	5.8E-03	2.8E-02	3.3E-02	48.47%
	3.9E-08	QN	7.1E-02	4.3E-03	3.0E-04	0.0E+00	3.0E-04	0.44%
		0.14 8.5E-07	.07 2.0E-05	1.6E-05	2.0E-03	5.3E-02	5.5E-02	79.83%
EFH Fractions						;		
C11-C22 Aromatics 280	1.3E-05	0.17 3.4E-04	.04 3.0E-02	2.7E-02	4.4E-04	1.3E-02	1.3E-02	19.10%
C19-C36 Aliphatics 630	3.0E-05	0.17 7.7E-04	-04 6.0E+00	5.5E+00	4.9E-06	1.4E-04	1.5E-04	0.211%
VPH Fractions					****			
C5-C8 Aliphatics 3.3	1.5E-07	0.17 4.0E-06	-06 6.0E-02	5.5E-02	2.6E-06	7.4E-05	7.6E-05	0.111%
C9-C10 Aromatics 4.3	2.0E-07	0.17 5.3E-06	.06 3.0E-02	2.7E-02	6.7E-06	2.0E-04	2.0E-04	0.293%
C9-C12 Aliphatics 5.6	2.6E-07	0.17 6.9E-06	.06 6.0E-01	5.5E-01	4.4E-07	1.2E-05	1.3E-05	0.0188%

RECCH-SW3R

INCIDENTAL INGESTION OF AND DERMAL CONTACT WITH SURFACE WATER - CENTRAL TENDENCY CURRENT/FUTURE RECREATIONAL CHILD (6-16 YEARS)
AOC 57 AREA 3 RECREATIONAL

FORT DEVENS, MA

EXPOSURE PARAMETERS

PARAMETER	SYMBOL	SYMBOL VALUE	UNITS	
CONCENTRATION WATER	CW	average	mg/liter	CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR (mg/kg-day)"
INGESTION RATE	ĸ	0.013	liters/hour	
SURFACE AREA EXPOSED	SA	2,518	cm²/day	HAZARD QUOTIENT = INTAKE (mg/kg-day) / REFERENCE DOSE (mg/kg-day)
CONVERSION FACTOR	CF	0.001	liter/cm ³	
BODY WEIGHT	BW	38	kg	INTAKE = (INTAKE-INGESTION) + (INTAKE-DERMAL)
EXPOSURE TIME	ET	2	hours/day	
EXPOSURE FREQUENCY	HB.	26	days/year	$NTAKE-INGESTION = CW \times IR \times ET \times EF \times ED$
EXPOSURE DURATION	æ	=	years	BW x AT x 365 days/yr
AVERAGING TIME				
CANCER	AT	07	years	INTAKE-DERMAL = $\frac{CW \times Kpevent \times ET \times SA \times CF \times EF \times ED}{}$
NONCANCER	AT	=	years	BW x AT x 365 days/yr
PERMEABILITY COEFFICIENT	Kpevent ·	Chemical-specific	cm/day	
Notes:				,
For noncarcinogenic effects: AT = ED				
ND - Value not determined				
TPHC - Total Petroleum Hydrocarbons				

RECCH-SW3R

INCIDENTAL INGESTION OF AND DERMAL CONTACT WITH SURFACE WATER - CENTRAL TENDENCY CURRENT/FUTURE RECREATIONAL CHILD (6-16 YEARS)
AOC 57 AREA 3 RECREATIONAL
FORT DEVENS, MA
CARCINOGENIC EFFECTS

ERCENT TOTAL RISK	3.90% 6.10%	
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TOTAL CANCER RESK	2.1E-06	8
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TOTAL CANCER RESK		
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INTAKE DERMAL (mg/kg-tby)	.7E	
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ERMEABILIEN COEFFICIENT (cm/hour)	1.0E-03 1.2E+00	
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	Arsenic Benzo(k)fluoranthene	1
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COMPOUND	CONCENTRATION (sig/L)	INTAKE INGESTION (mg/kg-day)	HERMKABILITY COEFFICIENT (cm/howr)	INTAKE DERMAL (mg/kg-day)	REFERENCE DOSE ORAL ORAL ORAS	CE DOSE DERMAL (mg/kg-day)	HAZÁRD QUOTIENT INGESTION	BAZARD QUOTIENT DERMAL	TOTAL HAZARD QUOTIENT	PERCENT TOTAL RISK
Antimony	0.0056	2.7E-07	1.0E-03	5.3E-08	4.0E-04	6.0E-05	6.82E-04	8.81E-04	1.6E-03	4.59%
Arsenic	0.153	7.5E-06	1.0E-03	1.4E-06	3.0E-04	2.9E-04	2.49E-02	4.98E-03	3.0E-02	87.62%
Barium	0.278	1.4E-05	1.0E-03	2.6E-06	7.0E-02	4.9E-03	1.94E-04	5.36E-04	7.3E-04	2.14%
Manganese	0.093	4.5E-06	1.0E-03	8.8E-07	2.4E-02	1.4E-03	1.89E-04	6.27E-04	8.2E-04	2.40%
Benzo(k)fluoranthene	0.00094	4.6E-08	1.2E+00		Q	ΩN				
EPH Fractions	590	3.2E-05	Z		3.0E-02	2.7E-02	1.06E-03		1.1E-03	3.10%
C10-C22 Albhanes C19-C36 Alibhatics	1.1	5.4E-05	Y.Z		6.0E+00	5.5E+00	8.94E-06		8.9E-06	0.026%
VPH Fractions	3600	1 25.04	7		3.05-02	2.7E-02	4.06E-05		4.1E-05	0.12%
Cy-Clu Aromatics	7700	1.45.00					!			
					SUMMARY HAZARDINDEX	ARDINDEX	£0'0	10.0	£0.0	

CON-SS3R
INCIDENTAL INGESTION OF AND DERMAL CONTACT WITH SURFACE SOIL - RME
FUTURE CONSTRUCTION WORKER
AOC 57 AREA 3 RECREATIONAL
FORT DEVENS, MA

16-Mar-00

EXPOSURE PARAMETERS

CONCENTRATION SOIL						
	S	See Below*	mg/kg	CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR (mg/kg-day)-1	FACTOR (mg/kg-day)-1	
INGESTION RATE	Ħ	480	mg/day			
FRACTION INGESTED	H	100%		HAZARD QUOTIENT = INTAKE (mg/kg-day) / REFERENCE DOSE (mg/kg-day)	E DOSE (mg/kg-day)	
SOIL ADHERENCE FACTOR	SAF	0.28	mg/cm²			
SURFACE AREA	SA	5200	cm2			
CONVERSION FACTOR	ភ	1000001	kg/mg	INTAKE = (INTAKE-INGESTION) + (INTAKE-DERMAL)		
BODY WEIGHT	BW	07	Ŋ,	•		
EXPOSURE FREQUENCY	品	250	days/year	$INTAKE-INGESTION = CS \times IR \times FI \times CF \times EF \times ED$	QI.	
EXPOSURE DURATION	æ	0.5	years	BW x AT x 365 days/yr		
AVERAGING TIME						
CANCER	AT	70	years	$INTAKE-DERMAL = CS \times SA \times SAF \times AE \times CF \times EF \times ED$	x ED	
NONCANCER	AT	0.5	years	BW x AT x 365 days/yr		
DERMAL ABSORPTION	AE	Chemical-specific	unitless			
EFFICIENCY						
Notes:						
For noncarcinogenic effects: AT = ED						
The dermal absorption efficiency is from the Risk Assessment Guidance for Superfund Volume I:	sk Assessment Guidance	for Superfund Volume I:		-		
Human Health Evaluation Manual Supplemental Guidance Dermal Risk Assessment, 1998.	d Guidance Dermal Risk	: Assessment, 1998.				
*The lesser of the 95 % upper confidence limit (UCL) & maximum concentration.	(UCL) & тахітит соп	centration.				
ND = Value not determined						ı

CON-SS3R
INCIDENTAL INGESTION OF AND DERMAL CONTACT WITH SURFACE SOIL - RME
FUTURE CONSTRUCTION WORKER
AOC 57 AREA 3 RECREATIONAL
FORT DEVENS, MA

CARCINOGENIC EFFECTS

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INTAKE DERMAL 1g/kg-day	5	8	
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	Arsenic	Dieldrin	

	SOIL	INTAKE	DERMAL	INTAKE	REFERENCE DOSE	asoq a	HAZARD	BAZARD	TOTAL	PERCENT
COMPOUND	CONCENTRATION	INGESTION	ABSORPTION	DERMAL	ORAL	DERMAL	QUOTIENT	QUOTIENT	HAZARD	TOTAL
	(mg/kg)	(wg/kg-day)	RFRICHENCY	(mg/kg-day)	(mg/kg-day) (mg/kg-day)	(mg/kg-day)	INGESTION	DERMAL	QUOTIENT	RISK
Arsenic	28	1.3E-04	0.03	1.2E-05	3.0E-04	2.9E-04	4.4E-01	4.1E-02	4.8E-01	79.80%
Manganese	170	8.0E-04	ND	0.0E+00	7.1E-02	4.30E-03	1.1E-02	0.0E+00	1.1E-02	1.87%
Dieldrin	0.14	6.6E-07	QN	0.0E+00	5.0E-05	ΩN	1.3E-02		1.3E-02	2.19%
VPH										
C9-C12 Aliphatics	1500	7.0E-03	0.17	3.6E-03	6.0E+00	5.5E+00	1.2E-03	6.6E-04	1.8E-03	0.31%
C9-C10 Aronatics	009	2.8E-03	0.17	1.5E-03	3.0E-01	2.7E-01	9.4E-03	5.4E-03	1.5E-02	2.46%
ЕРН									!	
C9-C18 Aliphatics	1,300.0	6.1E-03	0.17	3.1E-03	6.0E+00	5.5E+00	1.0E-03	S.7E-04	1.6E-03	0.26%
C19-C36 Aliphatics	20,000	9.4E-02	0.17	4.8E-02	6.0E+01	5.5E+01	1.6E-03	8.8E-04	2.4E-03	0.41%
C11-C22 Aronatics	3,100	1.5E-02	0.17	7.5E-03	3.0E-01	2.7E-01	4.9E-02	2.8E-02	7.6E-02	12.70%
				SUMMARY	SUMMARY HAZARD INDEX	×	5.0	80.0	9.0	



CON-SS3R
INHALATION EXPOSURE TO PARTICULATES IN SURFACE SOIL - RME
FUTURE CONSTRUCTION WORKER
AOC 57 AREA 3 RECREATIONAL
FORT DEVENS, MA

EXPOSURE PARAMETERS

PARAMETER	SYMBOL	VALUE	UNITS	
CONCENTRATION SOIL*	SS	See below	mg/kg	CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR (mg/kg-day)-1
CONCENTRATION AIR PARTICULATES	САр	Calculated	mg/m³	
CONCENTRATION AIR VOLATILES	CAv	Calculated	mg/m³	HAZARD QUOTIENT = INTAKE (mg/kg-day) / REFERENCE CONCENTRATION (mg/kg-day)
VOLATILIZATION FACTOR**	VF	Calculated	m³/kg	
PARTICULATE EMISSIONS FACTOR	PEF	1.32E+09	ug/m³	
INHALATION RATE	IhR	3.3	m²/hour	INTAKE - INHALATION = (CAp + Cav) x RAF x IhR x ET x EF x ED
BODY WEIGHT	BW	07	kg	BW x AT x 365 days/yr
EXPOSURE TIME	ET	∞	hours/day	
EXPOSURE FREQUENCY	H3	250	days/year	
EXPOSURE DURATION	69	0.5	years	AIR CONCENTRATION PARTICULATES = CS x I/PEF
RELATIVE ABSORPTION FACTOR	RAF	%001	•	
AVERAGING TIME				AIR CONCENTRATION VOLATILES = $CS \times 1/VF$
CANCER	AT	70	years	(VF not calculated because there are no VOCs selected as CPCs).
NONCANCER	AT	0.50	years	
Notes: * Soil concentration used is the lesser of the 95 % upper confidence	er confidence limit (UCL) &	limit (UCL) & maximum concentration	uc	
**Volatilization factor used only for volatile chemicals of potential concern.	ntial concern.			
For noncarcinogenic effects: AT = ED				
ND = Value not determined				

CON-SS3R INHALATION EXPOSURE TO PARTICULATES IN SURFACE SOIL - RME FUTURE CONSTRUCTION WORKER AOC 57 AREA 3 RECREATIONAL FORT DEVENS, MA

CARCINOGENIC EFFECTS

PERCENT TOTAL RISK	99.47%	0.53%		
CANCER RISK	5.9E-10	3.1E-12		01-39
CER SLOPE ACTOR g/kg-day)+1	1.5E+01	1.6E+01		CER RISK
AKE CAN day) (mg	3.9E-11	2.0E-13		MMARYCAN
ATES INT	2.1E-08			16
ENTRATION PARTICUL (mg/m	-		_	
AIR CONC VOLATILES (mg/m²)				
	NA	Ϋ́Z		
FION (m	28	0.14		
SOEL CONCENTRA (mg/kg)				
POUND				
Ö				
	Arsenic	Dieldrin		

Arsenic dangenese 170 NA 2.1E-08 5.5E-09 ND 2.4E-03 9.84% 9ieldrin Jieldrin 0.14 NA 1.3E-07 3.3E-08 1.4E-05 2.4E-03 99.84% 9c-12 Aliphatics 1.500 NA 1.1E-06 2.9E-07 5.7E+00 5.1E-08 0.0022% 9c-12 Aliphatics 1,300.0 NA 4.5E-07 1.2E-07 5.7E+00 6.9E-07 0.029% 19c-13 Aliphatics 1,300.0 NA 9.8E-07 2.5E-07 5.7E+00 4.5E-08 0.0019% 19c-23 Aliphatics 2.0E-07 3.9E-06 4.5E-08 0.0019% 0.0019% 11-C22 Aromatics 3,100 NA 2.3E-06 6.1E-07 3.0E-06 0.13% 11-C22 Aromatics 3,100 NA 2.3E-06 6.1E-07 3.0E-06 0.13%	дихомиох	SOIL CONCENTRATION (mg/kg)	V.R.	AIR CONCENTRATION VOLATILES FARTIC (ing/m²) (mg/m²)	FTRATION FARTICULATES INTAKE (mg/kg-/day)	INTAKE (mg/kg-day)	REFERENCE DOSE (ing/kg-day)	HAZARD QUOTIENT	PERCENT TOTAL RISK
Sige 170 NA 1.3E-07 3.3E-08 1.4E-05 2.4E-03 Aliphatics 1500 NA NA 1.1E-06 2.9E-07 5.7E+00 5.1E-08 0 Aromatics Asoliphatics 1,300.0 NA NA 9.8E-07 2.5E-07 5.7E+00 5.1E-08 0 Asoliphatics 1,300.0 NA NA 9.8E-07 2.5E-07 5.7E+00 4.5E-08 0 Aromatics 3,100 NA 1.5E-05 3.9E-06 6.1E-07 2.0E-01 3.0E-06 Aromatics 3,100 NA 2.3E-06 6.1E-07 2.0E-01 3.0E-06	Absenic	28			2.1E-08	5.5E-09	QN		
Aliphatics	Manganese	170			1.3E-07	3.3E-08	1.4E-05	2.4E-03	99.84%
Aromatics Aromat	Dieldrin	0.14			1.16-10	2.7E-11	ΩN		
Atomatics Atomat	VPH Co C12 A linhofice	1500			1.1E-06	2.9E-07	5.7E+00	5.1E-08	0.0022%
Aliphatics Aromatics 3.100 NA NA 9.8E-07 2.5E-07 5.7E+00 4.5E-08 0.8E-08 3.9E-05 3.9E-07 2.0E-01 3.0E-08 0.9E-07 3.100 NA 2.3E-06 6.1E-07 2.0E-01 3.0E-06 0.902	C9-C10 Aronatics	009			4.5E-07	1.2E-07	1.7E-01	6.9E-07	0.029%
20,000 NA 1.5E-05 3.9E-06 ND 3.0E-06 3.0E-07 3.0E-06 3.0E-07 3.0E-06 3.0E-07 3.0E-06 3.0E-06 3.0E-06 3.0E-06 3.0E-08 3	EPH C9-C18 Alinhatics	1.300.0	Ϋ́Z		9.8E-07	2.5E-07	5.7E+00	4.5E-08	0.0019%
3,100 NA 2,3E-06 6.1E-07 2.0E-01 3.0E-06 3.0E-	C19-C36 Aliphatics	20,000	YZ V		1.5E-05	3.9E-06	ΩN		
	C11-C22 Aromatics	3,100	AN		2.3E-06	6.1E-07	2.0E-01	3.0E-06	0.13%
						SUMMARY	HAZARD INDEX		

CON-SB3R
INCIDENTAL INGESTION OF AND DERMAL CONTACT WITH SUBSURFACE SOIL - RME
FUTURE CONSTRUCTION WORKER
AOC 57 AREA 3 RECREATIONAL
FORT DEVENS, MA

14-Mar-00

EXPOSURE PARAMETERS

PARAMETER	SYMBOL	VALUE	UNITS	
CONCENTRATION SOIL	ಬ	See Below*	mg/kg	CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR (mg/kg-day)-1
INGESTION RATE	띪	480	mg/day	
FRACTION INGESTED	Ħ	100%		HAZARD QUOTIENT = INTAKE (mg/kg-day) / REFERENCE DOSE (mg/kg-day)
SOIL ADHERENCE FACTOR	SAF	0.28	mg/cm²	
SURFACE AREA	SA	\$200	cm ²	
CONVERSION FACTOR	ç	1000000	kg/mg	INTAKE = (INTAKE-INGESTION) + (INTAKE-DERMAL)
BODY WEIGHT	BW	70	kg	
EXPOSURE FREQUENCY	43	250	days/year	INTAKE-INGESTION = $\frac{CS \times IR \times FI \times CF \times EF \times ED}{}$
EXPOSURE DURATION	Œ	0.5	years	BW x AT x 365 daystyr
AVERAGING TIME				
CANCER	AT	70	years	INTAKE-DERMAL = CS x SA x SAF x AE x CF x EF x ED
NONCANCER	AT	0.5	years	BW x AT x 365 days/yr
DERMAL ABSORPTION	AE	Chemical-specific	unitless	
EFFICIENCY				
Notes:				
For noncarcinogenic effects: AT = ED				
The dermal absorption efficiency is from the Risk Assessment Guidance for Superfund Volume 1:	lisk Assessment Guidance	for Superfund Volume 1:		
Hurnan Health Evaluation Manual Supplemental Guidance Dermal Risk Assessment, 1998.	tal Guidance Dermal Risk	Assessment, 1998.		
*The lesser of the 95 % upper confidence limit (t (UCL) & maximum concentration.	centration.		
ND = Value not determined				

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CON-SB3R
INCIDENTAL INGESTION OF AND DERMAL CONTACT WITH SUBSURFACE SOIL - RME
FUTURE CONSTRUCTION WORKER
AOC 57 AREA 3 RECREATIONAL
FORT DEVENS, MA

CARCINOGENIC EFFECTS

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INHALATION EXPOSURE TO PARTICULATES IN SUBSURFACE SOIL - RME FUTURE CONSTRUCTION WORKER
AOC 57 AREA 3 RECREATIONAL
FORT DEVENS, MA

EXPOSURE PARAMETERS

CONCENTRATION SOLU- CONCENTRATION SOLU- CONCENTRATION SOLU- CONCENTRATION SOLU- CONCENTRATION SOLU- CONCENTRATION SOLU- CONCENTRATION AIR PARTICULATES CAP Calculated Calculated Ing/m² mag/m² HAZARD QUOTIENT = INTAKE (mg/kg-day) / REFERENCE CONCENTRATION (mg/kg-day) CONCENTRATION AIR VOLATILES CAv Calculated Calculated Ing/m² mg/m² HAZARD QUOTIENT = INTAKE (mg/kg-day) / REFERENCE CONCENTRATION (mg/kg-day) PARTICULATE EMISSIONS FACTOR INHALATION RATE BODY WEIGHT BODY WEIGHT BODY WEIGHT EXPOSURE REQUIENCY EXPOSURE REQUIENCY EXPOSURE REQUIENCY EXPOSURE REQUIENCY EXPOSURE REQUIENCY EFF BW AT AT AR CONCENTRATION PARTICULATES = CS x 1/PE AR CONCENTRATION PARTICULATES = CS x 1/PE EXPOSURE REQUIENCY EXPOSURE REQUIENCY EXPOSURE BURATION AVERAGING TIME EF 2.30 days/year AR AR CONCENTRATION PARTICULATES = CS x 1/PE AVERAGING TIME AT 0.50 years AR CONCENTRATION PARTICULATES = CS x 1/PE AR AVERAGING TIME AT 0.50 years (VP not calculated because there are no VOGs selected as CPC3). AR Noncancentration **Volatilization florer used only for validite chemicals of potential concern. AT 0.50 years (VP not calculated because there are no VOGs selected as CPC3).		7501510			
PARTICULATES CAP Calculated calculated mag/m² VOLATILES CAv Calculated calculated mag/m² TOR** VF Calculated calculated mag/m² DNS FACTOR PEF 1.32E+09 ug/m³ DNS FACTOR BW 70 kg BW TO kg kg FT EF 2.50 days/year N FACTOR RAF 100% years NONCANCER AT TO years NONCANCER AT TO years AT = ED AT AT AT	CONCENTRATION SOIL*	ಬ	See below	mg/kg	CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR (mg/kg-day)-1
VOLATILES CAv Calculated Calculated TOR** mg/m² Calculated TOR** DNS FACTOR PEF 1.32E+09 ug/m² Ug/m² DNS FACTOR BW 3.3 m²/hcu FT BW 70 kg FT BW 70 kg FT EF 2.50 days/year N FACTOR RAF 100% years NONCANCER AT 0.5 years NONCANCER AT 0.50 years NONCANCER AT 0.50 years AT 0.50 years AT 0.50 years AT Cost years AT = ED AT AT	CONCENTRATION AIR PARTICULATES	CAp	Catculated	mg/m³	
TOR*** VF Calculated DNS FACTOR m²/kg ONS FACTOR PEF 1.32E+09 ug/m² DNS FACTOR BW 70 kg FT BW 70 kg FT S hours/day RF 2.50 days/year N FACTOR RAF 100% N FACTOR AT 0.5 Used is the lesser of the 95 % upper confidence limit (UCL) & maximum concentration years AT 0.50 years AT = ED AT = ED	CONCENTRATION AIR VOLATILES	CAv	Catculated	mg/m³	HAZARD QUOTIENT = INTAKE (mg/kg-day) / REFERENCE CONCENTRATION (mg/kg-day)
ONS FACTOR PEF 1.32E+09 ug/m² IhR 3.3 m²/hour BW 70 kg FT 8 hoursday FF 2.50 days/year ED 0.5 years IN FACTOR RAF 100% years NONCANCER AT 0.50 years NONCANCER AT 0.50 years only for volatile chemicals of potential concent. AT 0.50 years AT = ED AT = ED AT AT AT AT	VOLATILIZATION FACTOR**	VF	Calculated	m³/kg	
IhR 3.3 m²/hour BW 70 kg	PARTICULATE EMISSIONS FACTOR	PEF	1.32E+09	ug/m³	
PW 70 kg FT 8 hours/day FT 8 hours/day BF 250 days/year RD 0.5 years NONCANCER AT 70 years NONCANCER AT 0.50 years used is the lesser of the 95 % upper confidence limit (UCL) & maximum concentration only for volatile chemicals of potential concern. AT = ED AT = ED	INHALATION RATE	IhR	3.3	m?/hour	$INTAKE - INHALATION = (CAD + Cav) \times RAF \times IhR \times ET \times EF \times ED$
Y ET 8 hours/day F 250 days/year ED 0.5 years IN FACTOR RAF 100% NONCANCER AT 70 years NONCANCER AT 0.50 years ased is the lesser of the 95 % upper confidence limit (UCL) & maximum concentration only for volatile chemicals of potential concern. AT = ED	BODY WEIGHT	BW	20	kg	BW x AT x 365 days/yr
Y EF 250 days/year ED 0.5 years NO FACTOR RAF 100% AT 70 years NONCANCER AT 0.50 years used is the lesser of the 95 % upper confidence limit (UCL) & maximum concentration only for volatile chemicals of potential concern. AT = ED AT = ED	EXPOSURE TIME	ET	80	hours/day	
PACTOR RAF 100%	EXPOSURE FREQUENCY	EF	250	days/year	
N FACTOR CANCER AT 70 years NONCANCER AT 0.50 years used is the lesser of the 95 % upper confidence limit (UCL) & maximum concentration only for volatile chemicals of potential concern. AT = ED	EXPOSURE DURATION	Œ	0.5	years	AIR CONCENTRATION PARTICULATES = CS x 1/PEF
CANCER AT 70 years NONCANCER AT 0.50 years used is the lesser of the 95 % upper confidence limit (UCL) & maximum concentration only for volatile chemicals of potential concern. AT = ED	RELATIVE ABSORPTION FACTOR	RAF	%001	٠	
CANCER AT 70 years NONCANCER AT 0.50 years used is the lesser of the 95 % upper confidence limit (UCL) & maximum concentration only for volatile chemicals of potential concern. AT = ED	AVERAGING TIME				AIR CONCENTRATION VOLATILES = CS x 1/VF
NONCANCER AT 0.50 used is the lesser of the 95 % upper confidence limit (UCL) & maximum concentration only for volatile chemicals of potential concern. AT = ED		AT	0,	years	(VF not calculated because there are no VOCs selected as CPCs).
used is the lesser of the 95 % upper confidence limit (UCI only for volatile chemicals of potential concern. AT = ED	NONCANCER	AT	0.50	years	
**Volatilization factor used only for volatile chemicals of potential concern. For noncarcinogenic effects: AT = ED ND = Value not determined	Notes: * Soil concentration used is the lesser of the 95 % upper confidence.	dence limit (UCL) & m	aximum concentration		
For noncarcinogenic effects: AT = ED ND = Value not determined	**Volatilization factor used only for volatile chemicals of potential cont	ncern.		-	
ND = Value not determined	For noncarcinogenic effects: AT = ED			,	
	ND = Value not determined				

CON-SB3R
INHALATION EXPOSURE TO PARTICULATES IN SUBSURFACE SOIL - RME
FUTURE CONSTRUCTION WORKER
AOC 57 AREA 3 RECREATIONAL
FORT DEVENS, MA

CARCINOGENIC EFFECTS

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CON-SS3R(CT)
INCIDENTAL INGESTION OF AND DERMAL CONTACT WITH SURFACE SOIL - CENTRAL TENDENCY
PUTURE CONSTRUCTION WORKER
AOC 57 AREA 3 RECREATIONAL
FORT DEVENS, MA

16-Mar-00

EXPOSURE PARAMETERS

PARAMETER	SYMBOL	VALUE	UNITS		
CONCENTRATION SOIL	S	See Below*	mg/kg	CANCER RISK = INTAKE	CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR (mg/kg-day)-1
INGESTION RATE	IR	480	mg/day		
FRACTION INGESTED	E	%001		HAZARD QUOTIENT = IN	HAZARD QUOTIENT = INTAKE (mg/kg-day) / REFERENCE DOSE (mg/kg-day)
SOIL ADHERENCE FACTOR	SAF	0.28	mg/cm³		
SURFACE AREA	SA	\$200	cm ²		
CONVERSION FACTOR	ŗ.	0.000001	kg/mg	INTAKE = (INTAKE-INGE	INTAKE = (INTAKE-INGESTION) + (INTAKE-DERMAL)
BODY WEIGHT	BW	92	Ŗ		
EXPOSURE FREQUENCY	EF.	250	days/year	INTAKE-INGESTION =	CS x IR x Fl x CF x EF x ED
EXPOSURE DURATION	ED	0.25	years		BW x AT x 365 days/yr
AVERAGING TIME					
CANCER	AT	70	years	INTAKE-DERMAL =	CS x SA x SAF x AE x CF x EF x ED
NONCANCER	AT	0.25	years		BW x AT x 365 days/yr
DERMAL ABSORPTION	AE	Chemical-specific	unitless		
EFFICIENCY					
Notes:					
For noncarcinogenic effects: AT = ED					
The dermal absorption efficiency is from the Risk Assessment Guidance for Superfund Volume I:	isk Assessment Guidance	for Superfund Volume I:			
Human Health Evaluation Manual Supplemental Guidance Dermal Risk Assessment, 1998.	tal Guidance Dermal Risk	Assessment, 1998.			
* The lesser of the 93 % upper community (OCL) & maximum concernance. ND = Value not determined	נינסטיין פל וואמיוווויוויון כסייי				
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CON-SS3R(CT)
INCIDENTAL INGESTION OF AND DERMAL CONTACT WITH SURFACE SOIL - CENTRAL TENDENCY
PUTURE CONSTRUCTION WORKER
AOC 57 AREA 3 RECREATIONAL
FORT DEVENS, MA

CARCINOGENIC EFFECTS

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COMPOUND	SOIL CONCENTRATION (mg/kg)	INTAKE INGESTION (mg/kg-day)	DERMAL ABSORPTION EFFICENCY	INTAKE DERMAL (ng/kg-day)	ORAL DERA (DIRKE-(43)) (DERA	EDOSE DERNÍAL (mg/kg-day)	HAZARD QUOTIENT INGESTION	BAZARD QUOTIENT DERMAL	TOTAL HAZARD QUOTTENT	PERCENT TOTAL RISK
Arsenic	28	1.3E-04	0.03	1.2E-05	3.0E-04	2.9E-04	4.4E-01	4.1E-02	4.8E-01	79.80%
Manganese	170	8.0E-04	ŊŊ	0.0E+00	7.1E-02	4.30E-03	1.1E-02	0.0E+00	1.1E-02	1.87%
Dieldrin	0.14	6.6E-07	QN	0.0E+00	5.0E-05	ΩŽ	1.3E-02	·	1.3E-02	2.19%
VPH	1500	7.05-03	0.17	3.6E-03	00E+00	5.5E+00	1.2E-03	6.6E-04	1.8E-03	0.31%
C9-C12 Auptratics	009	2.8E-03	0.17		3.0E-01	2.7E-01	9.4E-03	5.4E-03	1.5E-02	2.46%
EPH Co C18 Alishatia	1 300 0	6 1F-03	0.17	3.1E-03	6.0E+00	5.5E+00	1.0E-03	5.7E-04	1.6E-03	0.26%
C19-C36 Aliphatics	20.000	9.4E-02	0.17		6.0E+01	5.SE+01	1.6E-03	8.8E-04	2.4E-03	0.41%
C11-C22 Aromatics	3,100	1.5E-02	0.17	7.5E-03	3.0E-01	2.7E-01	4.9E-02	2.8E-02	7.6E-02	12.70%
				SUMMARY	SUMMARY HAZARD INDEX	X	S:0	0:08	0.6	

CON-SS3R(CT)
INHALATION EXPOSURE TO PARTICULATES IN SURFACE SOIL - CENTRAL TENDENCY
FUTURE CONSTRUCTION WORKER
AOC 57 AREA 3 RECREATIONAL
FORT DEVENS, MA

EXPOSURE PARAMETERS

CONCENTRATION SOIL*	Symbot	VALUE See below		CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR (mg/kg-day)-1
CONCENTRATION AIR PARTICULATES CONCENTRATION AIR VOLATILES VOLATILIZATION FACTOR**	CAy VF	Calculated Calculated Calculated	നൂ/സ് നൂ/സ് നീ/kg	HAZARD QUOTIENT = INTAKE (mg/kg-day) / REFERENCE CONCENTRATION (mg/kg-day)
PARTICULATE EMISSIONS FACTOR INHALATION RATE	PEF IhR RW	1.32E+09 3.3 70	ug/m³ m³/hour kg	INTAKE - INHALATION = $(CAp + Cav) \times RAF \times I li R \times ET \times EF \times ED$ BW x AT x 365 days/yr
BODI WEIGHT	E .	85	hours/day	
EXPOSURE FREQUENCY EXPOSURE DURATION	EF ED	250	days/year years	AIR CONCENTRATION PARTICULATES = CS x 1/PEF
RELATIVE ABSORPTION FACTOR AVERAGING TIME	RAF	100%		AIR CONCENTRATION VOLATILES = CS x 1/VF
CANCER	AT AT	0.25	years	(VF not calculated because there are no VOCs selected as CPCs).
Notes: * Soil concentration used is the lesser of the 95 % upper confidence limit (UCL) & maximum concentration **Volatilization factor used only for volatile chemicals of potential concern.	r confidence limit (UCL) & n tial concern.	naximum concentration		
For noncarcinogenic effects: A1 = ED ND = Value not determined				

CON-SS3R(CT)
INHALATION EXPOSURE TO PARTICULATES IN SURFACE SOIL - CENTRAL TENDENCY
FUTURE CONSTRUCTION WORKER
AOC 57 AREA 3 RECREATIONAL
FORT DEVENS, MA

CARCINOGENIC EFFECTS

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GANDAMOS	SOR. CONCENTRATION (mg/kg)	V(i) (m/λg)	AIR.CONCENTRATION VOLATILES PARTIC (mg/m²) (ng/m²)	ULATES /m²)	INTAKE (mg/kg·day)	REFERBNCE DOSE (ng/kg-day)	HAZARD QUOTIENT	PERCENT TOTAL RISK
Arsenic	28	NA		2.1E-08	5.5E-09	QN		
Manganese	170	YZ.		1.3E-07	3.3E-08	1.4E-05	2.4E-03	99.84%
Dieldrin	0.14			1.1E-10	2.7E-11	Q		
VPH		;		1	1000	001013	90 21 3	790000
C9-C12 Aliphatics	1500	ď		1.15-00	10-26.7	J. / E+00	0.11.0	0.7700.0
C9-C10 Aromatics	009	NA A		4.5E-07	1.2E-07	1.7E-01	6.9E-07	0.029%
EPH							!	
C9-C18 Aliphatics	1,300.0	AN	•	0.8E-07	2.5E-07	5.7E+00	4.5E-08	0.0019%
C19-C36 Aliphatics	20,000	AN		1.5E-05	3.9E-06	QX		
C11-C22 Aromatics	3,100	AN		2.3E-06	6.1E-07	2.0E-01	3.0E-06	0.13%
					SUMMARY	SUMMARY HAZARD INDEX	0.902	

CON-SB3R/CT)
INHALATION EXPOSURE TO PARTICULATES IN SUBSURFACE SOIL - CENTRAL TENDENCY
FUTURE CONSTRUCTION WORKER
AOC 57 AREA 3 RECREATIONAL
FORT DEVENS, MA

EXPOSURE PARAMETERS

	CANCER SLOPE FACTOR (mg/kg-day)-1		HAZARD QUOTIENT = INTAKE (mg/kg-day) / REFERENCE CONCENTRATION (mg/kg-day)			RAFxInRxETxEFxED	5 days/yr			= CS x 1/PEF		S x 1/VF	Cs selected as CPCs).					
****	CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR (mg/kg-day)-1		HAZARD QUOTIENT = INTAKE (mg/kg-			INTAKE - INHALATION - (CAp + Cav) x RAF x INR x ET x EF x ED	BW x AT x 365 days/yr			AIR CONCENTRATION PARTICULATES = CS x 1/PEF		AIR CONCENTRATION VOLATILES = CS x 1/VF	(VF not calculated because there are no VOCs selected as CPCs).					
UNITS	mg/kg	mg/m	mg/m³	m³/kg	ug/m³	m³/hour	kg	hours/day	days/year	years		٠	years	years			•	
VALUE	See below	Calculated	Calculated	Calculated	1.32E+09	3.3	70	8	250	0.25	100%		70	0.25	maximum concentration			
SYMBOL	S	CAp	CAv	VF	PEF	IhR	BW	ET	田	А	RAF		AT	AT	confidence limit (UCL) &	al concern.		
PARAMETER	CONCENTRATION SOIL*	CONCENTRATION AIR PARTICULATES	CONCENTRATION AIR VOLATILES	VOLATILIZATION FACTOR**	PARTICULATE EMISSIONS FACTOR	INHALATION RATE	BODY WEIGHT	EXPOSURE TIME	EXPOSURE FREQUENCY	EXPOSURE DURATION	RELATIVE ABSORPTION FACTOR	AVERAGING TIME	CANCER	NONCANCER	Notes: * Soil concentration used is the lesser of the 95 % upper confidence limit (UCL) & maximum concentration	**Volatilization factor used only for volatile chemicals of potential concern.	For noncarcinogenic effects: AT = ED	ND = Value not determined

CON-SB3R(CT)
INHALATION EXPOSURE TO PARTICULATES IN SUBSURFACE SOIL - CENTRAL TENDENCY
FUTURE CONSTRUCTION WORKER
AOC 57 AREA 3 RECREATIONAL
FORT DEVENS, MA

CARCINOGENIC EFFECTS

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CON-SB3R(CT)
INCIDENTAL INGESTION OF AND DERMAL CONTACT WITH SUBSURFACE SOIL - CENTRAL TENDENCY
FUTURE CONSTRUCTION WORKER
AOC 57 AREA 3 RECREATIONAL
FORT DEVENS, MA

14-Mar-00

EXPOSURE PARAMETERS

CONCENTRATION SOIL	SS	See Below*	mg/kg	CANCER RISK = INTAKE	CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR (mg/kg-day)-1
INGESTION RATE	IR	. 480	mg/day		
FRACTION INGESTED	E	100%		HAZARD QUOTIENT = IN	HAZARD QUOTIENT = INTAKE (mg/kg-day) / REFERENCE DOSE (mg/kg-day)
SOIL ADHERENCE FACTOR	SAF	0.28	mg/cm³		
SURFACE AREA	SA	2200	cm ₃		
CONVERSION FACTOR	ę,	1000000	kg/mg	INTAKE = (INTAKE-ING)	NTAKE = (INTAKE-INGESTION) + (INTAKE-DERMAL)
BODY WEIGHT	BW	07	ķ		
EXPOSURE FREQUENCY	덈	250	days/year	INTAKE-INGESTION =	CS x IR x Fl x CF x EF x ED
EXPOSURE DURATION	æ	0.25	years		BW x AT x 365 days/yr
AVERAGING TIME					
CANCER	AT	70	years	INTAKE-DERMAL =	CS x SA x SAF x AE x CF x EF x ED
NONCANCER	AT	0.25	years		BW x AT x 365 days/yr
DERMAL ABSORPTION	ΑE	Chemical-specific	unitless		
EFFICIENCY				- 11	
Notes:					
For noncarcinogenic effects: AT = ED					
The dermal absorption efficiency is from the Risk Assessment Guidance for Superfund Volume I:	sk Assessment Guidane	e for Superfund Volume I:			
Human Health Evaluation Manual Supplemental Guidance Dermal Risk Assessment, 1998.	d Guidance Dermal Rish	k Assessment, 1998.			
*The lesser of the 95 % upper confidence limit (UCL)	(UCL) & maximum concentration.	acentration.			•

CON-SB3R(CT)
INCIDENTAL INGESTION OF AND DERMAL CONTACT WITH SUBSURFACE SOIL - CENTRAL TENDENCY
FUTURE CONSTRUCTION WORKER
AOC S7 AREA 3 RECREATIONAL
FORT DEVENS, MA

CARCINOGENIC EFFECTS

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NONCARCINOGENIC EFFECTS

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RES-SSAR
INCIDENTAL INGESTION OF AND DERMAL CONTACT WITH SURFACE SOIL - RME
UNRESTRICTED LAND USE - ADULT RESIDENT
AOC 57 AREA 3 RECREATIONAL
FORT DEVENS, MA

14-Mar-00

EXPOSURE PARAMETERS

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CONCENTRATION SOIL	cs	See Below*	mg/kg	CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR (mg/kg-day)-1	ANCER SLOPE FACTOR (mg/kg-day)-1
INGESTION RATE	IR	001	mg/day		
FRACTION INGESTED	E	%001		HAZARD QUOTIENT =: INTAKE (mg/kg-day) / REFERENCE DOSE (mg/kg-day)	y) / REFERENCE DOSE (mg/kg-day)
SOIL ADHERENCE FACTOR	SAF	0.08	mg/cm²		
SURFACE AREA EXPOSED	SA	2,800	cm²	INTAKE = (INTAKE-INGESTION) + (INTAKE-DERMAL)	.KE-DERMAL)
CONVERSION FACTOR	Ç	0.000001	kg/mg		
BODY WEIGHT	BW	02	ş	INTAKE-INGESTION = CS x IR x FI	CS x IR x FI x CF x EF x ED
EXPOSURE FREQUENCY	댐	150	days/year	BWxAT	BW x AT x 365 days/yr
EXPOSURE DURATION	60	24	years		
AVERAGING TIME				INTAKE-DERMAL = CS x SA x SAF x	CS x SA x SAF x AE x CF x EF x ED
CANCER	AT	07	years	BWxAT	BW x AT x 365 days/yr
NONCANCER	AT	24	years		
DERMAL ABSORPTION	ΑE	Chemical-specific	unitless		
EFFICIENCY					
Notes:					
for noncarcinogenic effects: AT = ED					
The dermal absorption efficiency is from the Risk Assessment Guidance for Superfund Volume I:	k Assessment Guidance	for Superfund Volume 1:			
Human Health Evaluation Manual Supplemental Guidance Dermal Risk Assessment, 1998.	Guidance Dermal Risk	Assessment, 1998.			
*The lesser of the 95 % upper confidence limit (UCL) & maximum concentration.	UCL) & maximum con	centration.			
ND = Value not determined	NF = Route not evaluated				

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RES-SS3R INCIDENTAL INGESTION OF AND DERMAL CONTACT WITH SURFACE SOIL - RME UNRESTRICTED LAND USE - ADULT RESIDENT AOC 57 AREA 3 RECREATIONAL FORT DEVENS, MA

CARCINOGENIC EFFECTS

PERCENT POTAL POTAL 95.56% 4.44%	11000
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COMPOUND	SOIL CONCENTRATION (mg/kg)	INTAKE INGESTION (ng/(g:dey)	DERMAL ABSORPTION EFFICEENCY	INTAKE DERMAL (mg/kg-day)	REFERENCE DOSE ORAL (nig/sg-g-day) (nig/sg	CE DOSE DERMAL (mg/kg-day)	HAZARD QUOTIENT INGESTION	HAZARD QUOTIENT DERMAL	TOTAL HAZARD QUOTTENT	PERCENT TOTAL RISK
Arsenic	28	1.6E-05	0.03	2.3E-06	3.0E-04	2.9E-04	5.5E-02	7.9E-03	6.3E-02	29.80%
Manganese	0/1	1.0E-04	QN		7.1E-02	QZ	1.4E-03		1.4E-03	0.67%
Dieldrin	0.14	8.2E-08	QN		5.0E-05	ΩZ	1.6E-03		1.6E-03	0.78%
VPH										
C9-C12 Aliphatics	1500	8.8E-04	0.17	6.9E-04	6.0E-01	5.5E-01	1.5E-03	1.3E-03	2.7E-03	1.30%
C9-C10 Aromatics	009	3.5E-04	0.17	2.8E-04	3.0E-02	2.7E-02	1.2E-02	1.0E-02	2.2E-02	10.47%
ЕРН										
C9-C18 Aliphatics	1300	7.6E-04	0.17	6.0E-04	6.0E-01	5.5E-01	1.3E-03	1.1E-03	2.4E-03	1.13%
C19-C36 Aliphatics	20,000	1.2E-02	0.17	9.3E-03	6.0E+00	5.5E+00	2.0E-03	1.7E-03	3.6E-03	1.73%
C11-C22 Aronatics	3,100	1.8E-03	0.17	1.4E-03	3.0E-02	2.7E-02	6.1E-02	5.3E-02	1.1E-01	54.12%
				SUMMARY	SUMMARY HAZARD INDEX	×	F-0	90'M	V. C	

RES-SS3R INHALATION EXPOSURE TO PARTICULATES IN SURFACE SOIL - RME UNRESTRICTED LAND USE - ADULT RESIDENT AOC 57 AREA 3 RECREATIONAL FORT DEVENS, MA

EXPOSURE PARAMETERS

	CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR (mg/kg-day)-1		HAZARD QUOTIENT = INTAKE (mg/kg-day) / REFERENCE CONCENTRATION (mg/kg-day)			INTAKE - INHALATION = $(CAp + Cav) \times RAF \times IhR \times ET \times EF \times ED$	BW x AT x 365 days/yr			AIR CONCENTRATION PARTICULATES = CS x 1/PEF		AIR CONCENTRATION VOLATILES = CS x 1/VF	(VF not calculated because there are no VOCs selected as CPCs).					
UNITS	mg/kg CA			m³/kg		m³/hour	, K	hours/day	days/year	years	-	N P	years (VI	years			•	
VALUE	See below	Calculated	Calculated	Calculated	1.32E+09	0.63	70	∞	150	24	%001		70	24	t maximum concentration			
SYMBOL	ಬ	САР	CAv	VF	PEF	IhR	BW	탪	ដូ	ED	RAF		AT	AT	confidence limit (UCL) &	ial concern.		
PARAMETER	CONCENTRATION SOIL*	CONCENTRATION AIR PARTICULATES	CONCENTRATION AIR VOLATILES	VOLATILIZATION FACTOR**	PARTICULATE EMISSIONS FACTOR	INHALATION RATE	BODY WEIGHT	EXPOSURE TIME	EXPOSURE FREQUENCY	EXPOSURE DURATION	RELATIVE ABSORPTION FACTOR	AVERAGING TIME	CANCER	NONCANCER	Notes: * Soil concentration used is the lesser of the 95 % upper confidence limit (UCL) & maximum concentration	**Volatilization factor used only for volatile chemicals of potential concern.	For noncarcinogenic effects: AT = ED	



RES-SS3R INHALATION EXPOSURE TO PARTICULATES IN SURFACE SOIL - RME UNRESTRICTED LAND USE - ADULT RESIDENT AOC 57 AREA 3 RECREATIONAL FORT DEVENS, MA

CARCINOGENIC EFFECTS

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СОМРОКИЙ	SOA. CONCENTRATION (ang/rg)	γ.γ. (α// ² απ)	AIR CONCENTRATION VOLATILES FARTIC (mg/m²) (sp	ULATES (m²)	INTAKE (n)g/kg+day)	REFERENCE DOSE (Ing/kg-day)	HAZARD QUOTIENT	PERCENT TOTAL RISK
Arsenic	28	ΝA		2.1E-08	6.3E-10	QN		
Mankanese	170	NA		1.3E-07	3.8E-09	1.4E-05	2.7E-04	98.42%
Dieldrin	0.14	NA		1.15-10	3.1E-12	QN.		
NPH HAVE		;				i i	00 10	71.00
C9-C12 Aliphatics	1500	YZ.		1.15-06	3.4E-08	5.7E-01	5.9E-08	0.021%
C9-C10 Aromatics	009	Y'N		4.5E-07	1.3E-08	1.7E-02	7.9E-07	0.29%
EPH								
C9-C18 Aliphatics	1300	YY Y		9.8E-07	2.9E-08	5.7E-01	5.1E-08	0.018%
C19-C36 Aliphatics	20,000	AZ A		1.5E-05	4.5E-07	QN		
C11-C22 Aronatics	3,100	NA		2.3E-06	6.9E-08	2.0E-02	3.5E-06	1.26%
					SUMMARY HAZ	HAZARD INDEX	0.0003	

INCIDENTAL INGESTION OF AND DERMAL CONTACT WITH SURFACE SOIL - RME UNRESTRICTED LAND USE - CHILD RESIDENT (1 TO 6 YEARS)
AOC 57 AREA 3 RECREATIONAL
FORT DEVENS, MA

14-Mar-00

EXPOSURE PARAMETERS

CONCENTRATION SOIL	S	See Below*	mg/kg	CANCER RISK = INTAKE (1	CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR (mg/kg-day)-1
INGESTION RATE	R	300	mg/day		
FRACTION INGESTED	E	%001		HAZARD QUOTIENT = INT.	HAZARD QUOTIENT = INTAKE (mg/kg-day) / REFERENCE DOSE (mg/kg-day)
SOIL ADHERENCE FACTOR	SAF	-	mg/cm²		
SURFACE AREA EXPOSED	SA	2,045	CIII	INTAKE = (INTAKE-INGES)	INTAKE = (INTAKE-INGESTION) + (INTAKE-DERMAL)
CONVERSION FACTOR	C.P.	0.000001	kg/mg		
BODY WEIGHT	BW.	15	kg	INTAKE-INGESTION =	CS x IR x FI x CF x EF x ED
EXPOSURE FREQUENCY	ЯH	150	days/year		BW x AT x 365 days/yr
EXPOSURE DURATION	ED	9	years		
AVERAGING TIME				INTAKE-DERMAL =	CS x SA x SAF x AE x CF x EF x ED
CANCER	AT	07	years		BW x AT x 365 days/yr
NONCANCER	AT	9	years	**************************************	
DERMAL ABSORPTION	AE	Chemical-specific	unitless		
EFFICIENCY				·	
Notes:					
For noncarcinogenic effects: AT = ED					
The dermal absorption efficiency is from the Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual Supplemental Guidance Dermal Risk Assessment, 1998.	ssessment Guidano	for Superfund Volume I: Assessment, 1998.		<i>,</i>	
*The lesser of the 95 % upper confidence limit (UCL)	it (UCL) & maximum concentration.	centration.			

RES-SS3R INCIDENTAL INGESTION OF AND DERMAL CONTACT WITH SURFACE SOIL - RME UNRESTRICTED LAND USE - CHILD RESIDENT (1 TO 6 YEARS) AOC 57 AREA 3 RECREATIONAL FORT DEVENS, MA

CARCINOGENIC EFFECTS

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Arsenic 28 1.5E-04 0.03 Manganese 170 9.3E-04 ND	mg/kg-day) (mg/kg-day)	DERMAL (ing/kg-day)	QUOTIENT	DERMAL	HAZARD QUOTTENT	TOTAL
170 9.3E-04	-50	2.9E-04	5.1E-01	1.6E-01	6.7E-01	23.97%
	7.1E-02	QX	1.3E-02		1.3E-02	0.47%
Dieldrin 0.14 7.7E-07 ND	5.0E-05	QN	1.5E-02		1.5E-02	0.55%
HAA						
C9-C12 Aliphatics 1500 8.2E-03 0.17	1.4E-02 6.0E-01	5.5E-01	1.4E-02	2.6E-02	4.0E-02	1.41%
C9-C10 Aromatics 600 3.3E-03 0.17	5.7E-03 3.0E-02	2.7E-02	1.1E-01	2.1E-01	3.2E-01	11.43%
EPH 715.00 715.003 715.003 0.17	1 2E-02 6 0E-01	5.5E-01	1.2E-02	2.3E-02	3.4E-02	1.22%
10-31		5.5E+00	1.8E-02	3.5E-02	5.3E-02	1.88%
3,100 1.7E-02		2.7E-02	5.7E-01	1.1E+00	1.7E+00	29.06%

INHALATION EXPOSURE TO PARTICULATES IN SURFACE SOIL - RME UNRESTRICTED LAND USE - CHILD RESIDENT (1 TO 6 YEARS) AOC 57 AREA 3 RECREATIONAL FORT DEVENS, MA

### EXPOSURE PARAMETERS

	mg/kg CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR (mg/kg-day)-1	mg/m²	mg/m² HAZARD QUOTIENT = INTAKE (mg/kg-day) / REFERENCE CONCENTRATION (mg/kg-day)	m²/kg		m/hour INTAKE - INHALATION = (CAP + CDV) x RAF x II, R x ET x EF x ED	kg BWxATx365 days/yr	hours/day	days/year	years AIR CONCENTRATION PARTICULATES = CS x 1/PEF		AIR CONCENTRATION VOLATILES = CS x 1/VF	years (VF not calculated because there are no VOCs selected as CPCs).	years				
SYMBOL	SO	CAp	CAv	VF	PEF	IhR	BW	13	EF	œ	RAF		AT	AT	confidence limit (UCL) & maxi	а сопсет.		
PARÁMETER	CONCENTRATION SOIL*	CONCENTRATION AIR PARTICULATES	CONCENTRATION AIR VOLATILES	VOLATILIZATION FACTOR**	PARTICULATE EMISSIONS FACTOR	INHALATION RATE	BODY WEIGHT	EXPOSURE TIME	EXPOSURE FREQUENCY	EXPOSURE DURATION	RELATIVE ABSORPTION FACTOR	AVERAGING TIME	CANCER	NONCANCER	Notes: * Soil concentration used is the lesser of the 95 % upper confidence limit (UCL) & maximum concentration	**Volatilization factor used only for volatile chemicals of potential concern.	For noncarcinogenic effects: AT = ED	

RES-SS3R INHALATION EXPOSURE TO PARTICULATES IN SURFACE SOIL - RME UNRESTRICTED LAND USE - CHILD RESIDENT (1 TO 6 YEARS) AOC 57 AREA 3 RECREATIONAL FORT DEVENS, MA

#### CARCINOGENIC EFFECTS

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RES-SB3R

INCIDENTAL INGESTION OF AND DERMAL CONTACT WITH SUBSURFACE SOIL - RME UNRESTRICTED LAND USE - ADULT RESIDENT AOC 57 AREA 3 RECREATIONAL FORT DEVENS, MA

02-Feb-00

EXPOSURE PARAMETERS

EQUATIONS

PARAMETER	TORWAS	VALUE	UNITS		
_	S	See Below*	mg/kg	CANCER RISK = INTAKE (1	CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR (mg/kg-day)-1
INGESTION RATE	R	001	mg/day		
FRACTION INGESTED	E	100%		HAZARD QUOTIENT = INT	HAZARD QUOTIENT = INTAKE (mg/kg-day) / REFERENCE DOSE (mg/kg-day)
SOIL ADHERENCE FACTOR	SAF	0.08	mg/cm²		
SURFACE AREA EXPOSED	SA	2,800	cm²	INTAKE = (INTAKE-INGES	INTAKE = (INTAKE-INGESTION) + (INTAKE-DERMAL)
CONVERSION FACTOR	ţ,	1000000	kg/mg		
BODY WEIGHT	BW	20	kg	INTAKE-INGESTION =	CS x IR x FI x CF x EF x ED
EXPOSURE FREQUENCY	田	150	days/year		BW x AT x 365 days/yr
EXPOSURE DURATION	Œ	24	years		
AVERAGING TIME				INTAKE-DERMAL =	CS x SA x SAF x AE x CF x EF x ED
CANCER	AT	70	years		BW x AT x 365 days/yr
NONCANCER	AT	24	years	-	
DERMAL ABSORPTION	AĒ	Chemical-specific	unitless		
EFFICIENCY					
Notes:					
For noncarcinogenic effects: AT = ED					
The dermal absorption efficiency is from the Risk Assessment Guidance for Superfund Volume I:	k Assessment Guidance	for Superfund Volume I:			
Human Health Evaluation Manual Supplemental Guidance Dermal Risk Assessment, 1998.	Guidance Dermal Risk	Assessment, 1998.			
*The lesser of the 95 % upper confidence limit (UCL.) & maximum concentration.	UCL) & maximum cond	entration.		-	
ND = Value not determined NE	NE = Route not evaluated				

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RES-SB3R
INCIDENTAL INGESTION OF AND DERMAL CONTACT WITH SUBSURFACE SOIL - RME
UNRESTRICTED LAND USE - ADULT RESIDENT
AOC 57 AREA 3 RECREATIONAL
FORT DEVENS, MA

### CARCINOGENIC EFFECTS

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RES-SB3R
INHALATION EXPOSURE TO PARTICULATES IN SUBSURFACE SOIL - RME
UNRESTRICTED LAND USE - ADULT RESIDENT
AOC 57 AREA 3 RECREATIONAL
FORT DEVENS, MA

### EXPOSURE PARAMETERS

	CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR (mg/kg-day)-1		HAZARD QUOTIENT =: INTAKE (mg/kg-day) / REFERENCE CONCENTRATION (mg/kg-day)			INTAKE - INHALATION = $(CAD + Cav) \times RAF \times IR \times ET \times EF \times ED$	BW x AT x 365 days/yr			AIR CONCENTRATION PARTICULATES = CS x 1/PEF		AIR CONCENTRATION VOLATILES = CS x 1/VF	(VF not calculated because there are no VOCs selected as CPCs).					
UNITE	mg/kg	mg/m³	mg/m³	m³/kg	ng/m³	m³/hour	kg	hours/day	days/year	years			years	years				
VALUE	See below	Calculated	Calculated	Calculated	1.32E+09	0.63	70	8	150	24	100%		70	24	maximum concentration			
SYMBOL	SS	CAp	CAv	VF	PEF	IhR	BW	ET	H3	ED	RAF		AT	AT	onfidence limit (UCL) &	l concern.		
PARANETER	CONCENTRATION SOIL*	CONCENTRATION AIR PARTICULATES	CONCENTRATION AIR VOLATILES	VOLATILIZATION FACTOR**	PARTICULATE EMISSIONS FACTOR	INHALATION RATE	BODY WEIGHT	EXPOSURE TIME	EXPOSURE FREQUENCY	EXPOSURE DURATION	RELATIVE ABSORPTION FACTOR	AVERAGING TIME	CANCER	NONCANCER	Notes: * Soil concentration used is the lesser of the 95 % upper confidence limit (UCL) & maximum concentration	**Volatilization factor used only for volatile chemicals of potential concern.	For noncarcinogenic effects: AT = ED	ND = Value not determined

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RES-SB3R INHALATION EXPOSURE TO PARTICULATES IN SUBSURFACE SOIL - RME UNRESTRICTED LAND USE - ADULT RESIDENT AOC 57 AREA 3 RECREATIONAL FORT DEVENS, MA

#### CARCINOGENIC EFFECTS

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RES-SB3R
INCIDENTAL INGESTION OF AND DERMAL CONTACT WITH SUBSURFACE SOIL - RME
UNRESTRICTED LAND USE - CHILD RESIDENT (1 TO 6 YEARS)
AOC 57 AREA 3 RECREATIONAL
FORT DEVENS, MA

02-Feb-00

### EXPOSURE PARAMETERS

PARAMETER	SYMBOL	VALUE	UNITS		
CONCENTRATION SOIL	ಬ	See Below*	mg/kg	CANCER RISK = INTAKE	CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR (mg/kg-day)-1
INGESTION RATE	R	200	mg/day		
FRACTION INGESTED	E	%001		HAZARD QUOTIENT = IN	HAZARD QUOTIENT = INTAKE (mg/kg-day) / REFERENCE DOSE (mg/kg-day)
SOIL ADHERENCE FACTOR	SAF	-	mg/cm²	-	
SURFACE AREA EXPOSED	SA	2,045	cm³	INTAKE = (INTAKE-INGE	INTAKE = (INTAKE-INGESTION) + (INTAKE-DERMAL)
CONVERSION FACTOR	ხ	0.000001	kg/mg		
BODY WEIGHT	BW	15	kg	INTAKE-INGESTION =	CS x IR x FI x CF x EF x ED
EXPOSURE FREQUENCY	田	150	days/year		BW x AT x 365 days/yr
EXPOSURE DURATION	ED	9	years	.*	
AVERAGING TIME				INTAKE-DERMAL =	CS x SA x SAF x AE x CF x EF x ED
CANCER	AT	70	years		BW x AT x 365 days/yr
NONCANCER	AT	9	years		
DERMAL ABSORPTION	ΑĒ	Chemical-specific	unitless		
EFFICIENCY					
Notes:					
For noncarcinogenic effects: AT = ED					
The dermal absorption efficiency is from the Risk Assessment Guidance for Superfund Volume I:	Assessment Guidance	or Superfund Volume I:			
Human Health Evaluation Manual Supplemental Guidance Dermal Risk Assessment, 1998.	Juidance Dermal Risk	Assessment, 1998.			
*The lesser of the 95 % upper confidence limit (UCL) & maximum concentration.	СL) & тахітит сопс	entration.			
ND = Value not determined NE =	NE = Route not evaluated				

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RES-SB3R INCIDENTAL INGESTION OF AND DERMAL CONTACT WITH SUBSURFACE SOIL - RME UNRESTRICTED LAND USE - CHILD RESIDENT (1 TO 6 YEARS) AOC 57 AREA 3 RECREATIONAL FORT DEVENS, MA

## CARCINOGENIC EFFECTS

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## NONCARCINOGENIC EFFECTS

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INHESTRICTED LAND USE - CHILD RESIDENT (1 TO 6 YEARS)
AOC 57 AREA 3 RECREATIONAL
FORT DEVENS, MA

## EXPOSURE PARAMETERS

EQUATIONS

	CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR (mg/kg-day)-1		HAZARD QUOTIENT = INTAKE (mg/kg-day) / REFERENCE CONCENTRATION (mg/kg-day)			INTAKE - INHALATION = $(CAp + Cav) \times RAE \times IhR \times ET \times EE \times ED$	BW x AT x 365 days/yr			AIR CONCENTRATION PARTICULATES = CS x 1/PEF		AIR CONCENTRATION VOLATILES = CS × 1/VF	(VF not calculated because there are no VOCs selected as CPCs).					
	CANCER R		HAZARD Q			INTAKE - I				AIR CONC		AIR CONC	(VF not cale	1	r	<del></del>		
SLIND	mg/kg	mg/m³	mg/m³	m³/kg	ug/m³	m³/hour	ķg	hours/day	days/year	years			years	years	ı			
VALUE	See below	Calculated	Calculated	Calculated	1.32E+09	0.31	15	80	150	9	100%		70	9	aximum concentration			
SYMBOL	S	CAp	CAv	VF	PEF	IhR	BW	EE	EF	ED	RAF		AT	AT	confidence limit (UCL) & n	ial concern.		
PARAMETER	CONCENTRATION SOIL*	CONCENTRATION AIR PARTICULATES	CONCENTRATION AIR VOLATILES	VOLATILIZATION FACTOR**	PARTICULATE EMISSIONS FACTOR	INHALATION RATE	BODY WEIGHT	EXPOSURE TIME	EXPOSURE FREQUENCY	EXPOSURE DURATION	RELATIVE ABSORPTION FACTOR	AVERAGING TIME	CANCER	NONCANCER	Notes: * Soil concentration used is the lesser of the 95 % upper confidence limit (UCL) & maximum concentration	**Volatilization factor used only for volatile chemicals of potential concern.	For noncarcinogenic effects: AT = ED	ND = Value not determined

2/2/0011:37 AM

RES-SB3R
INHALATION EXPOSURE TO PARTICULATES IN SUBSURFACE SOIL - RME
UNRESTRICTED LAND USE - CHILD RESIDENT (1 TO 6 YEARS)
AOC 57 AREA 3 RECREATIONAL
FORT DEVENS, MA

CARCINOGENIC EFFECTS

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NONCARCINOGENIC EFFECTS

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RES-GW21 INGESTION OF GROUNDWATER AS DRINKING WATER (UNFILTERED SAMPLES) - RME UNRESTRICTED LAND USE - ADULT RESIDENT AOC 57 AREA 3 RECREATIONAL FORT DEVENS, MA

EXPOSURE PARAMETERS

PARAMETER	SYMBOL	VALUE	CANTA	
CONCENTRATION WATER	CW	chenical-specific	ug/liter	CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR (mg/kg-day)-1
INGESTION RATE	R	2	liters/day	
BODY WEIGHT	BW	07	K,	HAZARD QUOITIENT = INTAKE (mg/kg-day) / REFERENCE DOSE (mg/kg-day)
CONVERSION FACTOR	ភ	0.001	Sn/Bu	
EXPOSURE FREQUENCY	43	350	days/year	
EXPOSURE DURATION	a	30	years	INTAKE = CWxIRxEFxEDxCF
AVERAGING TIME				BW x AT x 365 days/year
CANCER	AT	20	years	
NONCANCER	AT	30	years	
Notes:				
For noncarcinogenic effects: AT = ED				

RES-GW21 INGESTION OF CROUNDWATER AS DRINKING WATER (UNFILTERED SAMPLES) - RME UNRESTRICTED LAND USE - ADULT RESIDENT AOC 57 AREA 3 RECREATIONAL FORT DEVENS, MA

CARCINOGENIC EFFECTS

11年93	SK [[]]	TOTAL CANCER IN			
4.9E-07	1.15-02	4.5E-05	3.8 ug/Liter	ř	Trichloroethene
3.4E-06	5.26-02	6.5E-05	b ug/Liter	3.5	Tetrachloroethene
	QN	1.5E-04	13 ug/Liter	<u>~</u>	Naphthalene
8.5E-06	1.4E-02	6.15-04	ug/Liter	35	Bis(2-ethylhexyl)phthalate
7.6E-07	2.4E-02	3.2E-05	2.7 ug/Liter		1,4-Dichlorobenzene
1.5E-03	1.5E+00	9.9E-04	84.4 ug/Liter	84.	Arsenic
PACESTION	EACTOR (Inp/kg-td1)?~1	bycestion (mp/kg-day):		CONCENTRATION	сомроджо
CANCER RISK	CANCER SLOPE	NTAKE	STING	WATER	

NONCARCINOGENIC EFFECTS

			(rag/kg-day)	(ing/kg/tay)	NOLESTION
Numinum	2450	2450 ug/Liter	6.7E-02	1.0E+00	6.72-02
rsenic	84.4	84.4 ug/Liter	2.3E-03	3.06-04	7.7E+00
8 0	0161	1910 ug/Liter	5.2E-02	Q	
danganese	346	346 ug/Liter	9.5E-03	2.4E-02	3.95-01
4-Dichlorobenzene	2.7	2.7 ug/Liter	7.4E-05	3.06-02	2.5E-03
lis(2-ethylhexyl)pbthalate	S	52 ug/Liter	1.4E-03	2.0E-02	7.1E-02
laphibalene	13	13 ug/Liter	3.65-04	2.0E-02	1.8E-02
Tetrachloroethene	5.5	5.5 ug/Liter	1.58-04	1.0E-02	1.5E-02
Trichloroethene	3.8	3.8 ug/Liter	1.05-04	6.0E-03	1,7E-02
S-C8 Aliphatics	8.68	89.5 ug/Liter	2.5E-03	6.0E-02	4.1E-02
9-C12 Aliphatics	42.5	42.5 ug/Liter	1.25-03	6.0E-01	1.95-03
29-C10 Aromatics	27.1	172 ug/Liter	4.7E-03	3.0E-02	1.6E-01

N-6 RISK SUMMARY TABLES

TABLE 1 RISK ASSESSMENT SUMMARY AREA 2 - INDUSTRIAL - MAINTENANCE WORKER AOC 57

REMEDIAL INVESTIGATION REPORT DEVENS, MASSACHUSETTS

Scenario Timeframe: Current/Future Receptor Population: Maintenance worker Receptor Age: Adult

Medium	Exposure	Exposure	Chemical		Carcinogenic Risk	genic Risk		Chemical	Noi	1-Carcinoge	Non-Carcinogenic Hazard Quotient	offent	
				Ingestion 1		Dermal	halation Dermal Exposure		Primary Tareet Organ	Ingestion	Ingestion Inhalation Dermal	Dermal	Exposure Routes Total
00:1	Surface Soil	Ares 2 - Industrial	Arsenic	2E-06	2E-09	2E-07	2E-06	Arsenic	Skin	0.014	:	0.0012	0.02
	om race com		Chromium	Ϋ́	SE-09	V.	SE-09	Chromium	NOAEL (GI) ²	0.0018	0.000018	ı	0.002
								Iron		!	ı	ı	1
								Manganese	NOAEL (Nervous system)	0.0014	0.00068	ı	0.002
								C9-C12 Aliphatics	Nervous system	0.000011	0.0000000011	0.0000056	0.00002
								C9-C10 Aromatics	Kidney	0.00016	0.000000027	0.000082	0.0002
								C9-C18 Aliphatics	Nervous system	0.00016	0.000000016	0.000081	0.0002
	,							C19-C36 Aliphatics	Liver	61000.0	1	0.000009	0.0003
							-	C11-C22 Aromatics	Kidney	0.012	0.0000017	0.0063	0.02
			(Total)	Total) 2E-06	7E-09	2E-07	2E-06	(Total)		0.03	0.0007	0.008	0.04
			Total Risk Across All Media and	ss All Media a	and All Exposure Routes	re Routes	2E-06		Total Hazard Index Across All Media and All Exposure Routes	cross All Mec	lia and All Expo	sure Routes	0.04
					•	4		_					
										ē	Tota	Total [Skin] HI =	0.02
-											To	Total [GI] HI =	0.002
	•										Total [Nervous system] HI ≈	iystem] HI =	0.002
											Total	Total [Liver] HI =	0.0003
											Total [F	Total [Kidney] HI =	0.02
											Total [N	Total [NOAEL] HI =	0.004

Notes:

- 1 RfD is based on NOAEL dose level. However, higher doses in study used to develop RfD were associated with effects on the nervous system.
- Therefore, the HQ for this chemical was included in the segregated HI for effects to the nervous system to provide a conservative estimate of the HI.
 - 2 RfD is based on NOAEL dose level. However, higher doses in study used to develop RfD were associated with effects on the GI system. Therefore, the HQ for this chemical was included in the segregated HI for effects to the GI system to provide a conservative estimate of the HI. Shaded value indicates a target organ-specife hazard index that exceeds the USEPA threshold hazard index value of 1, indicating that there is an
 - increased liklihood of adverse effects to this target organ/system.
- NA No toxicity data
- NOAEL No observable adverse effect level
 - HQ Hazard quotient
 - HI Hazard index
- -- = No toxicity data

AREA 2 - INDUSTRIAL - COMMERCIAL/INDUSTRIAL WORKER RISK ASSESSMENT SUMMARY TABLE 2 AOC 57

REMEDIAL INVESTIGATION REPORT DEVENS, MASSACHUSETTS

Receptor Population: Commercial/industrial worker Scenario Timeframe: Future Receptor Age: Adult

	Exposure Routes Total	40.0	8000.0	1	9000	0.00004	90000	9000'0	0.0008	0.05	0.1	0.0	0.07	0.07	0.2		0.04	0.0008	0.08	0.0008	0.05	0.08
ofient	Dermal	0.0026	ı	1	;	0.000012	0.00017	0.00017	0.00021	0.013	0.02	ΑN	ΑN	0.0	sure Routes		Total [Skin] HI =	Total [GI] HI =	system] HI =	Total [Liver] HI 🗕 📙	Total [Kidney] HI 🗕 📙	Total [NOAEL] HI =
Non-Carelnogenie Razard Quotient	Ingestion: Inhalation Dermal	1	0.0000053	1	0.002	0.0000000032	0.0000000077	0.000000046	1	0.000005	0.002	ΝA	NA	0.0	ia and All Expo		Tota	To	Total [Nervous system] HI =	Total	Total [Total (N
-Carcinogen	Ingestion	0.041	0.00079	1	0.004	0.000031	0.00045	0.00045	0.00056	0.035	0.08	0.002	0.072	0.07	cross All Med				•			
Noi	Primary Target Organ	Skin	NOAEL (GI) ²		NOAEL (Nervous system)1	Nervous system	Kidney	Nervous system	Liver	Kidney		NOAEL	NOAEL (Nervous system)1		Total Hazard Index Across All Media and All Exposure Routes							
Chemical		Arsenic	Chromium	Iron	Manganese	C9-C12 Aliphatics	C9-C10 Aromatics	C9-C18 Aliphatics	C19-C36 Aliphatics	C11-C22 Aromatics	(Total)	Aluminum	Manganese	(Total)		_						
	Exposure Routes Total	7E-06	2E-08								7E-06			0E+00	7E-06							
Carcinogenic Risk	alation Dermal	4E-07	ΑN								4E-07			0E+00	ure Routes	-						
Carreino	Inhalation	6E-09	2E-08								3E-08			0E+00	nd All Expos	•						
	Ingestion	7E-06	Ϋ́								7E-06	l		0E+00	ss All Media							
Chemical		Arsenic	Chromium								(Total)	Ϋ́Α		(Total)	Total Risk Across All Media and All Exposure Routes							
Exposure		Area 2 - Industrial										Area 2 - Industrial										
Exposure		Surface Soil										Groundwater										
Medium		Soil										Groundwater		*****						-		

- 1 RfD is based on NOAEL dose level. However, higher doses in study used to develop RfD were associated with effects on the nervous system.
- Therefore, the HQ for this chemical was included in the segregated HI for effects to the nervous system to provide a conservative estimate of the HI.
 - Therefore, the HQ for this chemical was included in the segregated HI for effects to the GI system to provide a conservative estimate of the HI. Shaded value indicates a target organ-specife hazard index that exceeds the USEPA threshold hazard index value of I, indicating that there is an 2 - RfD is based on NOAEL dose level. However, higher doses in study used to develop RfD were associated with effects on the GI system.
 - - increased liklihood of adverse effects to this target organ/system.
 - NA No toxicity data

NOAEL - No observable adverse effect level

- HQ Hazard quotient HI Hazard index
 - - = No toxicity data

AREA 2 - INDUSTRIAL - CONSTRUCTION WORKER AOC 57 RISK ASSESSMENT SUMMARY TABLE 3

REMEDIAL INVESTIGATION REPORT DEVENS, MASSACHUSETTS

Receptor Population: Construction worker Scenario Timeframe: Future Receptor Age: Adult

		_		=	-	-	-	_		-		_		_	==				-	7						—	
	Exposure Routes Total	0.4	9000	1	0.04	0.00004	90000	9000'0	0.0007	0.04	0.5	0.2	ı	0.02	0.0000007	0.00001	0.00001	0.00001	0.0007	0.2	9.0		0.5	9000	90'0	0.0007	0.05
otient		0.031	ı	1	1	0.000014	0.00021	0.0002	0.00025	0.016	0.05	510.0	1	1	0.0000003	0.0000037	0.0000036	0.0000044	0.00025	0.02	sure Routes		Total [Skin] HI =	Total [GI] HI =	system] HI =	Total [Liver] HI =	Total [Kidney] HI =
ic Hazard Qu	Ingestion Inhalation Dermal	-	0.00018	ı	0.0067	0.0000000011	0.000000026	0.000000016	ı	0.0000017	0.007	:	ı	0.0032	0.000000000	0.0000000005	0.000000003	:	0.00000003	0.003	is and All Expo		Tota	ŭ.	Total [Nervous system] HI =	Total	Total []
Non-Carcinogenic Hazard Quotient	Ingestion	0.33	0.0063	;	0.032	0.000025	0.00036	0.00036	0.00044	0.028	0.4	0.15	1	0.015	0.00000045	0.0000064	0.0000064	0.0000079	0.00049	0.2	Across All Med						
Ŷ.	Primary Target Organ	Skin	NOAEL (GI) ²		NOAEL (Nervous system)	Nervous system	Kidney	Nervous system	Liver	Kidney	3 6 7 7 7 7 7 7 7 7 8 8 8 8 8 8 8 8 8 8 8	Skin		NOAFI, (Nervous system)	Nervous system	Kidney	Nervous system	Liver	Kidney		Total Hazard Index Across All Media and All Exposure Routes						
Chemical		Arsenic	Chromium	Iron	Manganese	C9-C12 Aliphatics	C9-C10 Aromatics	C9-C18 Aliphatics	C19-C36 Aliphatics	C11-C22 Aromatics	(Total)	Arsenic	Iron	Manganese	C9-C12 Aliphatics	C9-C10 Aromatics	C9-C18 Alinhatics	C19-C36 Aliphatics	C11-C22 Aromatics	(Total)							
	Exposure Routes Total	2E-06	2E-09								2E-06	6E-07								6E-07	3E-06						
Carcinogenic Risk	Dermal	2E-07	¥								2F-07	5F-08								5E-08	ire Routes	IJ					
Сагенно	stion Inhalation Dermal	4E-10	2E-09								2F-09	2F-10	; }			•				2E-10	Media and All Exposure Routes	•					
	Ingestion	2F-06	×								į	SE-07	1							5E-07	ss All Media						
Chemical		Arcenio	Chromium								Total	Amonia	THE PARTY OF THE P							Total	Total Risk Across All						
Exposme	Point	Aven 2 Industrial										A contact of the contact of	Vice & - Monoraries														
Exposure	Mediam	CG. C	Surface Son									1.0	Suosurface Son														
Medium			201																								

1 - R.D. is based on NOAEL dose level. However, higher doses in study used to develop R.D were associated with effects on the nervous system.

Therefore, the HQ for this chemical was included in the segregated HI for effects to the nervous system to provide a conservative estimate of the HI.

Total |NOAEL| HI =

2 - R.D is based on NOAEL dose level. However, higher doses in study used to develop R.D were associated with effects on the GI system.

Therefore, the HQ for this chemical was included in the segregated HI for effects to the GI system to provide a conservative estimate of the HI. Shaded value indicates a target organ-specife hazard index that exceeds the USEPA threshold hazard index value of 1, indicating that there is an increased liklihood of adverse effects to this target organ/system.

NA - No toxicity data

NOAEL - No observable adverse effect level HQ - Hazard quotient HI - Hazard index

RISK ASSESSMENT SUMMARY AREA 2 - INDUSTRIAL - ADULT RESIDENT TABLE 4 AOC 57

REMEDIAL INVESTIGATION REPORT DEVENS, MASSACHUSETTS

Scenario Timeframe: Future Unrestricted Receptor Population: Resident Receptor Age: Adult

	fa]	Ī		**			-																	П		П	П	П		
	Exposure Routes Total	0.05	0.0053	1	0.005	0.00006	0.0008	0.0008	0.0010	0.07	0.1	0.02	1	0.002	0.000001	0.00002	0.00001	0.00002	0.001	0.03	0.0	0.2	0.2	0.4	0.07	0.005	0.2			0.2
otient	Dermal	0.0059	ı	ı	ı	0.000027	0.00039	0.00039	0.00048	0.03	0.04	0.0028	1	1	0.0000005	0.000007	0.0000069	0.0000085	0.00053	0.003	ΑN	Ϋ́	0.0	osure Routes	Total (Skin) HI =	Total [GI] HI =	system] HI =	Total [Liver] HI =	Total [Kidney] HI -	Total [NOAEL] HI =
Non-Carcingenic Hazard Quotient	. Iogestion: Iobalation	:	0.000021	1	0.00077	0.0000000013	0.00000003	0.000000018	1	0.000002	0.0008	1	t	0.00037	0.00000000000	0.00000000000	0.0000000003	ı	0.000000035	0.0004	AN	ΥN	0.0	fedia and All Exp	Tot	Ĕ	Total [Nervous system] HI =	Total	Total	Total [N
n-Carcing	Ingestion	0.041	0.0053	ı	0.004	0.000031	0.00045	0.00045	0.00056	0.035	60.0	0.019	1	0.0019	0.00000056	0.000008	0.000008	0.0000099	0.00061	0.02	0.0056	0.2	0.2	x Across All M						
Ž	Primaty Target Organ	Skin	NOAEL (GI) ²		NOAEL (Nervous system)1	Nervous system	Kidney	Nervous system	Liver	Kidney		Skin		NOAEL (Nervous system)	Nervous system	Kidney	Nervous system	Liver	Kidney		NOAEL	NOAEL (Nervous system)1		Total Hazard Index Across All Media and All Exposure Routes						
Chemieal		Arsenic	Chromium	Iron	Manganese	C9-C12 Aliphatics	C9-C10 Aromatics	C9-C18 Aliphatics	C19-C36 Aliphatics	C11-C22 Aromatics	(Total)	Arsenic	lron	Manganese	C9-C12 Aliphatics	C9-C10 Aromatics	C9-C18 Aliphatics	C19-C36 Aliphatics	C11-C22 Aromatics	(Total)	Aluminum	Manganese	(Total)							
	Exposure Routes Total	7E-06	8E-09								7E-06	3E-06								3E-06			0E+00	1E-05						
Carcinogenic Risk.	Dermat.	9E-07	¥								9E-07	4E-07								4E-07			0E+00	re Routes						
Carcino	ngestion Inhalation Dermal	2E-09	8E-09								1E-08	1E-09								1E-09			0E+00	All Media and All Exposure Routes						
	Ingestion	90-39	٧N								9E-06	3E-06								3E-06			0E+00	ss All Media						
Chemica)		Arsenic	Chromium								(Total)	Arsenic								(Total)	ΨN		(Total)	Total Risk Across						
Exposure		Area 2 - Industrial										Area 2 - Industrial									Area 2 - Industrial									
Exposure		Surface Soil										Subsurface Soil									Groundwater									
Medium		Soil	-																		Groundwater									

- 1 RD is based on NOAEL dose level. However, higher doses in study used to develop RID were associated with effects on the nervous system. Therefore, the HQ for this chemical was included in the segregated HI for effects to the nervous system to provide a conservative estimate of the HI. 2 RID is based on NOAEL dose level. However, higher doses in study used to develop RID were associated with effects on the GI system. Therefore, the HQ for this chemical was included in the segregated HI for effects to the GI system to provide a conservative estimate of the HI. Shaded value indicates a target organ-specife hazard index that exceeds the USEPA threshold hazard index value of 1, indicating that there is an increased likilhood of adverse effects to this target organ/system.

NA - No toxicity data

NOAEL - No observable adverse effect level

HQ - Hazard quotient

- = No toxicity data

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AREA 2 - INDUSTRIAL - CHILD RESIDENT RISK ASSESSMENT SUMMARY TABLE 5 AOC 57

REMEDIAL INVESTIGATION REPORT DEVENS, MASSACHUSETTS

Scenario Timeframe: Future Unrestricted Receptor Population: Resident Receptor Age: Child

Medium	Exposure	Exposure Point	Chemical		Carcinog	Carcinogenic Risk		Chemical	ž	n-Carcinogo	Non-Carcinogenic Hazard Quotlent		
				Ingestion	Ingestion Inhalation Derma		Exposure Routes Total		Primary Target Organ	Ingestion	Ingestion Inhalation Dermal		Exposure Routes Total
Coil	Surface Soil	Area 2 - Industrial	Arsenic	1E-05	1E-09	SE-06	2E-05	Arsenic	Skin	0.38	1	0.12	0.5
5				Ą	5E-09	NA A	5E-09	Chromium	NOAEL (GI) ²	0.049	0.000048	1	0.05
								Iron		1	:	1	ı
								Manganese	NOAEL (Nervous system) ¹	0.037	0.0018	ı	0.04
								C9-C12 Aliphatics	Nervous system	0.00029	0.0000000029	0.00055	0.0008
						,		C9-C10 Aromatics	Kidney	0.0042	0.00000007	0.0081	0.01
	,				•			C9-C18 Aliphatics	Nervous system	0.0042	0.000000042	0.0081	0.01
								C19-C36 Aliphatics	Liver	0.0052	1	8600'0	0.02
								C11-C22 Aromatics	Kidney	0.32	0.0000046	0.62	6,0
			(Total)	•	6E-09	5E-06	2E-05	(Total)		8.0	0.002	8.0	2
-	Subsurface Soil	Area 2 - Industrial	Arsenic	7E-06	6E-10	2E-06	90-36	Arsenic	Skin	0.18	ı	0.057	0.2
								Iron		1	,	;	ı
								Manganese	NOAEL (Nervous system) ¹	0.018	0.00085	ŧ	0.02
								C9-C12 Aliphatics	Nervous system	0.0000052	0.000000000000	660000000	0.00002
								C9-C10 Aromatics	Kidney	0.000075	0.0000000012	0.00014	0.0002
							-	C9-C18 Aliphatics	Nervous system	0.000075	0.0000000000	0.00014	0.0002
								C19-C36 Aliphatics	Liver	0.000092		0.00017	0,0003
								C11-C22 Aromatics	Kidney	0.0057	0.00000008	0.011	0.02
20.2			(Total)	7E-06	6E-10	2E-06	9E-06	(Total)		0.2	0.0009	0.07	0.3
			Total Risk Across All Media and All Exposure Routes	ss All Media a	nd All Exposur	e Routes	2E-05		Total Hazard Index Across All Media and All Exposure Routes	Across All M	fedia and All Expo	sure Routes	2
-						1						•	
											Tota	Total [Skin] HI =	0.7
											To	Total [GI] HI =	0.05
											Total [Nervous system] HI =	system HI =	0.07
											Total	Total [Liver] HI =	0.02
											Total [F	Total [Kidney] HI =	1
											Total [N	Total [NOAEL] HI =	0.1

1-RED is based on NOAEL dose level. However, higher doses in study used to develop RfD were associated with effects on the nervous system.

Therefore, the HQ for this chemical was included in the segregated HI for effects to the nervous system to provide a conservative estimate of the HI.

2 - RfD is based on NOAEL dose level. However, higher doses in study used to develop RfD were associated with effects on the GI system.

Therefore, the HQ for this chemical was included in the segregated HI for effects to the GI system to provide a conservative estimate of the HI. Shaded value indicates a target organ-specife hazard index that exceeds the USEPA threshold hazard index value of I, indicating that there is an

increased liklihood of adverse effects to this target organ/system.

NA - No toxicity data

NOAEL - No observable adverse effect level

HQ - Hazard quotient HI - Hazard index

TABLE 6 RISK ASSESSMENT SUMMARY AREA 2 - RECREATIONAL - RECREATIONAL VISITOR AOC 57

REMEDIAL INVESTIGATION REPORT DEVENS, MASSACHUSETTS

	. Medium	THOU .	_										
			***	· Idgėstion.	. Ingestion . Inhalation . Dermal.	Dermai	Exposure		Primary	Ingestion	Inhaladion Dérmi	Dermi	. Ekposuje
							Rquies Total		Tarket Orkan				· Roules Total
Surface Soil	Soil	Area 2 - Recreational	Arrenie	4E-06	¥	\$E-06	90-36	Arsenic	Skii	90'0	٧ ٧	0.072	7.0
			Aroclor-1260	4E-07	۲ ۲	35-06	35-06	Amelor-1260	insmuse system	0.067	ž	24.5	20
								Tan Tan		ı	ž	ı	
								Manganese	NOAEL (Nervous avstern)	0.0014	ź	ı	9.00
					-			C9-C12 Aliphatics	Nervous system	0,000013	ź	0.0000	0.0001
								Cy-C10 Arumatics	Kidney	0.00021	ž	0.0015	0.002
_								C9-C18 Aliphatics	Nervous system	6100010	ž	0.0013	0.001
					_	_		C19-C36 Aliphatics	Liver	0.00023	ź	9100'0	0.002
								C11-C22 Arametics	Kidney	0.014	٧×	0	0.1
			Total	L	0E+00	90-38	16-05	(Total)		0.1	0.0	0.6	0.8
Sediment	1	Area 2 - Recreational	Arsenic	\$E-06	VV	25-05	35-03	Ahminum	NOAEL	0.0015	ź	[-	0.002
			Lead	,	٧×	,	0E+00	Arsenic	Skin	0.069	ź	0.33	6.4
			Dickfrin	15-08	×	,	1E-08	Chromium	NOAEL (GI) ³	0.0015	ź	ı	0.002
								Iron		ı	ž	,	0.000
								Cond		,	ž	ı	0.000
								Manganese	NOAEL (Nervous system)	0.052	ž	ı	0.05
								DieMrin	Liver	0.000016	ž	,	600000
								ни	Kidney	10'0	٧×	0.39	0.3
			(Total)	SE-06	0E+00	2E-05		(Total)		0.07	0.0	9.0	0.4
LE WEIGT Surface Weigh	wild	Ares 2 - Recreational	Arrenic		Ϋ́	95-07		Aluminum	NOAE1.	\$100.0	٧×	,	0.003
			Lead	,	ž	1		Anenie	Skin	9.064	ž	0.013	80'0
_			BELLP	\$E-09	ž	;	SE-09	Berium	Cardiovascular	0.00077	ž	0.0021	0.003
			Chloroform	7E-11	ž	,	7E-11	Cadminn	Kithey	0,0049	ź	610'0	0.02
			PCE	15.09	ž	,	35-09	Chromium	NOAEL (GI) ³	0.0012	ž	0.0091	10.0
			TCE	66.10	ž	•	66-10	Copper		ı	ź	,	0.0
				_				Iron		ı	ź	ı	0.0
								3		1	ź	ı	0.0
								Manganese	NOAEL (Nervnus system)	0.0018	ź	0.0058	0.008
								Vanadium	NOAEL	0.001	ž	0.0075	0000
								BEHP	r i i	0,00012	ź		0000
								13-DCE	1 :	0.00028	ź;	,	0.0003
					•			Chimolorm	Even :	0.000076	ž ;	,	0.00000
								PCE	S .	0.000025	ź;	1	0,00003
							-	CIOCO Anomalica	Killery.	0.0045	ž 2	1 1	0.00
								C19-C36 Alphetics	الجا أ	0.000028	ž	1	0.00003
			Control	4E-06	0E+00	9E-07	5E-06	(Total)		0.07	0.0	90.0	0.1
			Tetal Rak Acr			ure Routes	1E-05		Total Hazard Index Acress All Medie and All Expender Rootes	Acress All Med	is and All Expo	aure Routes	-
						• .							
											- T	Tetal (Shin) III -	9.0
											ř	Tetal [GI] HI -	10.0
										•	Tetal (Nerveus system) III =	system HI =	90'0
											Tetal	Tatel [Liver] H1 -	200'0
											Tetal	Tetal (Kidney) H1 -	7'0
											Tetal [Cardevascular] III -	serdari III -	0.003
											Tetal (learness system) III =	system III =	6.5
											Tetal (N	Tetal (NOAEL, III =	80'0

Notes:

1. R.D. is based on NOAEL done level. However, higher dones is study used to develop R.D. were searchical with effects on the nervous system.

Therefore, the PG or in inclument was included in the regregated HI for effects to the revives system to provide a conservative estimate of the HI.

2. R.D. is based on NOAEL done level. However, higher dones in early used to develop R.D. were sunctional with effects on the CI system. Therefore, the Ky for his despreadent was behalfor a level synghold HI for effects to the CI system to provide a conservative estimate of the HI.

Standard white inclusion a target expression based to the caused late USEPA Membed hazard index tubes of 1, inclusing that there is no servant and section of a level servant and the section of the PL should hazard advise the section of the section of the PL should hazard advise the section of the section of the PL should hazard advise the section of the section of the PL should hazard advise the section of the section of the section of the PL should hazard advise the section of the section of the section of the PL should hazard advise the section of the

RISK ASSESSMENT SUMMARY AREA 2 - RECREATIONAL - CONSTRUCTION WORKER AOC 57 TABLE 7

REMEDIAL INVESTIGATION REPORT DEVENS, MASSACHUSETTS

Scenario Timeframe: Future Receptor Population: Construction worker Receptor Age: Adult

	Exposure Routes Total	8.0	0.5	1	0.02	0.00003	0.0004	0.0004	0.0004	0.03		4.0	1	0.01	0.03	9.0	0.0	0.001	7. 2	0.07	0,0002	0.002	0.002	0.003	0.2	2.9	4		-	9.0	0.04	0.004	0.2	0.7
	Dermal	120.0	0.18		ı	0.0000092	0.00015	0.00013	0.00016	0.01	0.3	0.031		1	1	ı	1	1	9:0	0.024	0.00000.0	0.00083	0.00082	0.001	0.063	0.7	ure Routes	.	Total (Skin) H1 =	Total [GI] HI =	vsteml HI =	Total [Liver] HI =	Total [Kidney] HI =	mmune system HI =
		:	ı	1	0.0038	0.0000000000	0.00000002	0.00000001	;	0.0000011	0.004	· t	:	0.0024	1	910'0	,	1	1	1	0.000000004	0.0000001	0.000000000	:	0.000007	0.02	a and All Expos		Total	Tot	Total [Nervous system] HI =	Total	Total (K	Total [Immune system] HI =
n-Carcinogen	Ingestion Inhalation	0.75	0.34	,	0.018	91000000	0.00027	0.00023	0.00028	0.018	1	6.33	1	0.011	0.033	0,57		0.0011	=	0.045	0.0001	0.0015	0.0015	0.0018	0.11	2	Across All Medi				-			L
	Primary Target Organ	Skin	Immune system		NOAEL (Nervous system)	Nervous system	Kidney	Nervous system	Liver	Kidney		Skin		NOAEL (Nervous system)	NOAEL	NOAEL (GI) ²		Liver	Immune system	Immune system	Nervous system	Kidney	Nervous system	Liver	Kidney		Total Hazard Index Across All Media and All Exposure Routes							
Wanting of the state of the sta		Arsenic	Aroclar-1260	Iron	Manganese	C9-C12 Aliphatics	C9-C10 Aromatics	C9-C18 Aliphatics	C19-C36 Aliphatics	C11-C22 Aromatics	(Total)	Arsenic	Iron	Manganese	Aluminum	Chromium	Lead	Dieldrin	Aroclor-1260	Aroclor-1248	C9-C12 Aliphatics	C9-C10 Aromatics	C9-C18 Aliphatics	C19-C36 Aliphatics	C11-C22 Aromatics	(Total)		•						
	Exposure Routes Total	2E-06	3E-07						-		3E-06	1E-06	0E+00	6E-09	1E-06	SE-08	1E-07									2E-06	SE-06							
Carcinogenic Kusik	Dermal	2E-07	1E-07								3E-07	1E-07	ı	,	4E-07	2E-08	¥									SE-07	re Routes							
Carcellog	Ingestion Inhalation Dermal	1E-09	IE-11						_		1E-09	4E-10	;	2E-13	3E-11	1E-12	1E-07	-	-							16-07	otal Risk Across All Media and All Exposure Routes							
	Ingestion	2E-06	2E-07	-			•				2E-06	1E-06	ı	6E-09	8E-07	3E-08	¥X					•				2E-06	oss All Media							
Chemical		Arsenic	Aroclor-1260								(Total)	Arsenic	Lead	Dieldrin	Aroclor-1260	Aroclor-1248	Chromium									(Total)	Total Risk Acr							
Exposure Point		Area 2 - Recreational										Area 2 - Recreational																						
Exposite Redium		Surface Soil										Subsurface Soil																						
Medium		Soil	į																		٠													

- 1 RID is based on NOAEL doze level. However, higher dozes in study used to develop RID were associated with effects on the nervous system. Therefore, the HQ for this chemical was included in the segregated HI for effects to the nervous system to provide a conservative estimate of the HI.

 2 RID is based on NOAEL doze level. However, higher dozes in study used to develop RID were associated while feders on the GI system. Therefore, the HQ for this chemical was included in the segregated HI for effects to the GI system to provide a conservative estimate of the HI. Shaded value indicates a target organ-specife hazard index that exceeds the USEPA threshold hazard index value of I, indicating that there is an increased likithood of adverse effects to this target organ/system.
- NOAEL No observable adverse effect level HQ Hazard quotient HI Hazard index -- = No toxicity data NA - No toxicity data

TABLE 8 RISK ASSESSMEYT SUMMARY AREA 2 - RECREATIONAL - ADULT RESIDENT AOC 57

REMEDIAL INVESTIGATION REPORT DEVENS, MASSACHUSETTS

Timeframe: Future Population: Reside Age: Adult	Future Unrestricted	Resident	
	neframe:	pulation:	eceptor Age: Adult
	Scenario	ž	2

	Medium	Forther											
				Inpestion.	Inhalation Dermat		Exposure		Pelutary	Ingestion	тарында Дегин	Dermal	Exposure
				ı	90.33		76		200	7000		100) ()
	our moc son	Area 2 - Recreational	1000	2 2	627	2 2	_	Amolog-1760	Transmit standard	110	. 1	0.086	:
			Voctor-1700	0.521	100	15-00	207	no temporal	Transfer admirat	;	1	2007	;
								Managada	MOAEL Oursells andemi	0.0023	0.00044	ı ı	0.003
								Co.C.1. Alinhotics	Nervana soutem	0.000021	O COCKERCION	0.000018	0.00004
								C9C10 Ammelies	Kidney	0.00033	0.000000072	0.00029	90000
								COC18 Alinhatics	Nervana sodem	0.0000	0.00000017	20000	0 0000
								Con Contraction	T in a	20000		110000	CONT.
								C19-C36 Auptration	M	0.00030	1	0.0003	(000)
								CHI-C22 Arometica	Kidney	0.00	U.U.KAKO I S	0.019	0.04
			(Total)	16-05	\$E-09	35.06	1E-05	(Total)		0.2	0.0004	3	6.3
	Subsurface Soil	Area 2 - Recreational	Arsenic	90-39	1E-09	9E-07	7E-06	Armenio	Skin	0.041	,	0.0059	0.05
			Lend	,	,	1	0E+00	g		,	,	•	
			Dieldrin	4E-08	IE-13	,	45.08	Manganese	NOAEL (Nervous system)	0.0014	0.00027	1	0.002
			Amelor-1260	SE-06	음	4E-06	9E-06	Auminum	NOAEL	0.004	•	ı	0.004
			Aroctor-1248	25-07	76-12	3E-07	46-07	Chromium	NOAEL (QD)	0.47	0,0019	ı	0.5
			Chromium	ž	8E-07	ž	8E-07	Lead		,	1	,	0.0
								Dieldrin	Liver	0.0013	,	,	0.001
								Amelor-1260	Institute system	0.35	1	0.29	_
								Aruelor-1248	branane system	0.014	1	0,011	0.03
			_					C9-C12 Alinhatics	Nervota average	0.00013	0.000000005	0.00011	0,0002
								Co.C.10 Anymatics	Kidney	8100.0	0.000001	91000	0.003
								C9C18 Aliobatics	Nervous system	0,0018	70000000	0,0016	0.003
								C19-C36 Aliphatica	Liver	0.0022	1	61000	0.004
								C11-C22 Aromatica	Kidney	0.14	0.000008	0.13	0,3
			(Part)	15.05	85.07	\$E-06	2E-05			-	0.002	0.4	-
oundwater	Groundwater	Area 2 - Recrustional	Amenic	4796	ź	ž	1. 79BOL	Amenic	Skin	_	ž	ź	CASS IN SUCCESS.
			Aroctor-1260	SE-06	ź	ź	SE-06	Aractor-1260	Іппани вучет	0.3	¥	ž	0.3
			нень	7F-05	ž	ź		- 144	Liver	0.55	ź	ž	9'0
			i i	16-05	ź	ź		200	Liver	0.04	ž	ž	40.04
			HJU	25-07	ž	ź		TCE	Liver	0,0087	ž	ž	0.009
							_	13-006	Liver	0.04	ž	ž	0.04
								Manganese	NOAEL (Nervous system)	0.83	ž	ž	R'O
			(Jobe)	15.03	00+30	OE+ON)	16-03	(Total)		7	0.0	0.0	7
			Total Risk Across All Media and All Exposure Routes	us All Media a	nd All Exposur	T Routes	1E-03		Total Hazard Index Across All Media and All Exposure Routes	x Across All N	ledis and All Expo	osure Routes	-
						,						•	
											Teta	fotal [Skin] Ht =	\$46.5 M
											£	Total (GI) HII -	5.0
											Tetal [Nervous system] HI -	system! HI -	870
											Tetal	Total [Liver] HI =	9.0
											Total [Total [Kidney] HI =	0.3
											Tetal [Immune system] HI =	system HI =	-

1-RD is based on NOAEL does level. However, higher doese in attaly used to develop RD were associated with effects on the zervices system.

Therefore, the HQ for this described in the agropated HI for effects to the nervous system to provide a conservative estimate of the HI.

2-RD is based on NOAEL does level. However, higher doese in study used to develop RD were associated with effects on the CI system. Therefore, the HQ for this chemical was included in the agrapted HI for effects to the CI system to provide a conservative estimate of the HI.

Therefore, the HQ for this chemical was included in the agrapted HI for effects to the CI system to provide a conservative estimate of the HI.

Therefore, the HQ for this chemical includes the agraptical HI centred to the CI system to provide a conservative estimate of the HI.

Shaded value includes an excess lifetime super-species have proper-bound of the USEPA cancer risk mages (1x10* to 1x10*).

NA -No toxicity date

HQ -Haman quotient

HH -Haman (sociative and the conservative that exceeds the support-bound of the USEPA cancer risk mages (1x10* to 1x10*).

BERP - Indice - the charactive desired to the the conservative that

RISK ASSESSMENT SUMMARY AREA 2 - RECREATIONAL - CHILD RESIDENT AOC 57 TABLE 9

REMEDIAL INVESTIGATION REPORT DEVENS, MASSACHUSETTS

Scenario Timeframe; Future Unrestricted Receptor Population: Resident Receptor Age: Child

	Exposure	Robies Form	3 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	The second secon	0.02	90000	600.0	800'0	0.01	9.0	5	0.5	:	0.01	0.03	4	0.0	0.001	6	6.4	0.004	0.05	0.05	90.0	4	82	23		1 2 2 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	*	0.1	1.0	I'M	1 2 3 4 5 most	1
tienc	Dermal	0.28	8.1	1	ı	0.00036	9000	0.0052	0.0063	0.4	2	0.12	1	ı	ı	ı	1	1	5.9	0.24	0.00230	0.033	0.032	0.039	2.5	6	sure Routes		Total (Skin) HI	Total (Gr) HI =	vetemi Hi =	- 10 man 1	Total [Kidney] HI	vetem) HI =	Total INOAEL! HI =
Non-Carcinogenic Hazard Quotient.	Ingestion Inhalation			,	0.001	0.000000002	0.000000051	0.000000027	1	0.0000029	0.001	-	1	0.00062	,	0.0043	,	,	,	1	0.000000012	0.000003	0.00000017	;	0.000018	0.005	Total Hazard Index Across All Media and All Exposure Routes		Total	1 2	Total (Nervous system) HI =	Total	Total	Total [Immune system] HI =	Total IN
on-Carcinog	Ingestion	0.87	66.0	1	0.021	0.00019	0.0031	0.0027	0.0033	0.21	2	86.0	1	0.013	0.026	4.4	1	0.0012	3,3	0.13	0.0012	0.017	0.017	0.021	1.3	10	x Across All N			•					
K	Primary	Cloring Cloring	Immine system		NOAEL (Nervous system)	Nervous system	Kidney	Nervous system	Liver	Kidney		Skin		NOAEL (Nervous system)	NOAEL	NOAEL (GI) ²		Liver	Immune system	Inumae system	Nervous system	Kidney	Nervous system	Liver	Kidney		Total Hazard Inde								
Chemical		Arcenie	Aroclor-1260	Iron	Manganese	C9-C12 Aliphatics	C9-C10 Aromatics	C9-C18 Aliphatics	C19-C36 Aliphatics	C11-C22 Aromatics	(Total)	Arsenic	iron	Manganese	Aluminum	Chromium	Lead	Dieldrin	Aroclor-1260	Aroclor-1248	C9-C12 Aliphatics	C9-C10 Aromatics	C9-C18 Aliphatics	C19-C36 Aliphatics	C11-C22 Aromatics	(Total)		a							
	Exposure	Routes Total.	9E-05								SE-05	2E-05	0E+00	8E-08	3E-05	18-06	4E-07	:								SE-05	1E-04								
Careinegenic Risk	Dermal	10.00	50.50	3							2E-05	SE-06	1		2E-05	8E-07	NA									3B-05	re Routes	-				•			
Careine	Ingestion Inhaiation Dermal	90 00	36 11	:							3E-09	1E-09	ı	8E-13	1E-10	4E-12	4F-07	;								4E-07	nd All Exposu	•							
	Ingestion	36 45	20-21	25-00	•						3E-05	1E-05	ı	8E-08	18-05	4E-07	Ą	:								2E-05	ss All Media a								
· Chémical			Arsenic	A10001-1200						·	CTotal	Arsenic	Lead	Dieldrin	Amelor-1260	Amelor-1248	Chromium									(Total)	Total Risk Across All Media and All Exposure Routes								
Exposure	Y O		Area 2 - Kecreational									Area 2 - Recreational																							
Exposure	Meanum		Surface Soil									Subsurface Soil		•																	•				
Medium			Soil																							-									

- 1 RID is based on NOAEL dose level. However, higher doses in study used to develop RID were associated with effects on the nervous system.

 Therefore, the HQ for this chemical was included in the segregated HI for effects to the nervous system to provide a conservative estimate of the HI.

 2 RID is based on NOAEL dose level. However, higher doses in study used to develop RID were associated with effects on the Gip system.

 Therefore, the HQ for this chemical was included in the segregated HI for effects to the GI system to provide a conservative estimate of the HI.

 Shaded value indicates a target organ-specife hazard index or chemical-specific hazard quotient that exceeds the USBPA threshold hazard index value of I, indicating that there is an increased hidthood of adverse effects to this target organ/system.

Shaded value indicates an excess lifetime cancer risk that exceeds the upper-bound of the USEPA cancer risk maye (1x10⁴ to 1x10⁴) NA - No toxicity data
NOAEL - No observable adverse effect level

HQ - Hazard quotient HI - Hazard index

AREA 3 - INDUSTRIAL - MAINTENANCE WORKER TABLE 10 RISK ASSESSMENT SUMMARY AOC 57

REMEDIAL INVESTIGATION REPORT DEVENS, MASSACHUSETTS

Receptor Population: Maintenance worker Scenario Timeframe: Current/Future Receptor Age: Adult

		Г	-						=		\Box	\Box	П		\Box	\Box	
	Exposure Routes Total	0.03	1	0.002	0.00001	0.0001	0.0000	0.0000	0.00	0.03	0.03		0.03	0.002	0.000002	0.0002	0.002
otient	Dermal	0.0024	ı	1	0.0000028	0.000017	0.00000064	0.00000067	0.000035	0.002	sure Routes		Total [Skin] HI =	system] HI =	Total [Liver] HI =	Total [Kidney] HI =	Total [NOAEL] HI -
c Hazard Qu	Inhalation		ı	0.00077	900000000000	0.0000000056	0.0000000000	١.	0.0000000000	0.0008	and All Expo		Tota	Total [Nervous system] HI -	Total	Total []	Total [N
Non-Carcinogenic Hazard Quotient	Ingestion: Inhalation Dermal	0.028	ı	91000	0.0000054	0.000033	0.0000012	0.0000013	0.000066	0.03	cross All Media			L			
Non	Primary Target Organ	Skin		NOAEL (Nervous system) ¹	Nervous system	Kidney	Nervous system	Liver	Kidney		Total Hazard Index Across All Media and All Exposure Routes						
Chemical		Arsenic	iron	Manganese	C9-C12 Aliphatics	C9-C10 Aromatics	C9-C18 Aliphatics	C19-C36 Aliphatics	C11-C22 Aromatics	(Total)		_					
	alation Dermal Exposure Routes Total	SE-06					-			5E-06	5E-06						
Carcinogenie Risk	Dermal	4E-07								4E-07	ire Routes						i
Carcino	Inhalation	4E-09								4E-09	nd All Exposi						
	Ingestion Inh	5E-06								5E-06	ss All Media a						
Chemical		Arsenic								(Total)	Total Risk Across All Media and All Exposure Routes						
Exposure		Area 3 - Industrial															
Exposure		Surface Soil															
Medium		Soil															

1 - RfD is based on NOAEL dose level. However, higher doses in study used to develop RfD were associated with effects on the nervous system.

Therefore, the HQ for this chemical was included in the segregated HI for effects to the nervous system to provide a conservative estimate of the HI. 2 - RfD is based on NOAEL dose level. However, higher doses in study used to develop RfD were associated with effects on the GI system.

Therefore, the HQ for this chemical was included in the segregated HI for effects to the GI system to provide a conservative estimate of the HI. Shaded value indicates a target organ-specific hazard index that exceeds the USEPA threshold hazard index value of 1, indicating that there is an

increased liklihood of adverse effects to this target organ/system.

NOAEL - No observable adverse effect level NA - No toxicity data

HQ - Hazard quotient

HI - Hazard index

AREA 3 - INDUSTRIAL - COMMERCIAL/INDUSTRIAL WORKER RISK ASSESSMENT SUMMARY TABLE 11 AOC 57

REMEDIAL INVESTIGATION REPORT **DEVENS, MASSACHUSETTS**

Receptor Population: Commercial/industrial worker Scenario Timeframe: Future Receptor Age: Adult

Medium	Exposure	Exposure Point	Chemical		Carcino	Carcinogenic Risk		Chemical		n-Carcinoge		jotient	
				Ingestion	Ingestion Inhalation Dermal	Dermal	Exposure Rontes Total		Primacy: Target Organ	Ingestion	Ingestion Kobalation	Dermal	Exposure Routes Total
Soil	Surface Soil	Area 3 - Industrial	Arsenic	1E-05	1E-08	8E-07	1E-05	Arsenic	Skin	0.08	-	0.0051	60.0
<u></u>								Iron		1	ı	1	,
								Manganese	NOAEL (Nervous system)	0.0045	0.0022	1	0.007
								C9-C12 Aliphatics	Nervous system	0.000016	0.0000000016	0.0000059	0.00002
								C9-C10 Aromatics	Kidney	0.000095	0.000000016	0.000037	0.0001
								C9-C18 Aliphatics	Nervous system	0.0000036	0.0000000004	0.0000013	0.000005
								C19-C36 Aliphatics	Liver	0.0000037	ı	0.0000014	0.000005
- Agent					-			C11-C22 Aromatics	Kidney	0.00019	0.000000027	0.000073	0.0003
ho-			(Total)	1E-05	1E-08	8E-07	1E-05	(Total)		0.08	0.002	10'0	0.09
Grandwater	Groundwater	Area 3 - Industrial	Arsenic		NA	NA AN	7 2B.04	Aluminum	NOAEL	61000	NA	ΑN	0.002
Glodinewater				5E-07	Y.	Ą	5E-07	Arsenic	Skin	1:1	¥X	Ϋ́N	
			Nanhthalene	1	ž	ž	0E+00		Kidney	0.17	NA NA	NA	0.2
·			Carbon Tetrachloride	2E-06	¥	AA	2E-06	Iron		:	ž	ΑN	0
			Chlomform	2E-07	ž	Ą	2E-07	Manganese	NOAEL (Nervous system)	0.19	NA	ΑN	0.2
			Tetrachloroethene	5E-07	¥	AN	5E-07	1,2-Dichlorobenzene	NOAEL	0.0011	KA V	NA	0.001
					•			1,4-Dichlorobenzene	NOAEL	0.0018	Ϋ́	Ϋ́	0.002
								Naphthalene	Liver	0.0098	ΝΑ	ΝΑ	0.01
								Carbon Tetrachloride	Liver	0.063	¥	Ϋ́	90:0
								Chloroform	Liver	0.0098	Ϋ́	ΑN	0.01
								Tetrachloroethene	Liver	0.0025	٧X	Y.	0.003
		•						C9-C10 Aromatics	Kidney	0.1	Ϋ́	NA	0.1
			(Total)	2E-04	0E+00	0E+00	2E-04	(Total)		2	0.0	0.0	2
			Total Risk Across All Media and All Exposure Routes	ss All Media a	nd All Exposur	re Routes	2E-04		Total Hazard Index Across All Media and All Exposure Routes	Across All Med	dia and All Expo-	sure Routes	2
	٠.				•	<u>.</u>		_				ا ب	
										٠.	Total	Total [Skin] HI =	1
**	•										Total [Nervous system] HI =	system] HII =	0.2
											Total	Total [Liver] HI =	0.09
u.a.											Total [K	Total (Kidney) HI =	0.3
											Total [N	Total [NOAEL] HI =	0.01

1 - RD is based on NOAEL dose level. However, higher doses in study used to develop RD were associated with effects on the nervous system.

Therefore, the HQ for this chemical was included in the segregated HI for effects to the nervous system to provide a conservative estimate of the HI.

2 - RD is based on NOAEL dose level. However, higher doses in study used to develop RD were associated with effects on the GI system.

Therefore, the HQ for this chemical was included in the segregated HI for effects to the GI system to provide a conservative estimate of the HI.

Shaded value indicates a target organ-specife hazard index or chemical-specific hazard quotient that exceeds the USEPA threshold hazard index value of 1, indicating that there is an

Shaded value indicates an excess lifetime cancer risk that exceeds the upper-bound of the USEPA cancer risk range (1x10⁴ to 1x10⁴) increased likihood of adverse effects to this target organ/system.

NA - No toxicity data
NOAEL - No observable adverse effect level
HQ - Hazard quotient
HI - Hazard index

AREA 3 - INDUSTRIAL - CONSTRUCTION WORKER RISK ASSESSMENT SUMMARY TABLE 12

REMEDIAL INVESTIGATION REPORT DEVENS, MASSACHUSETTS

Receptor Population: Construction worker Scenario Timeframe: Future Receptor Age: Adult

			_	_	_	_	_	_	_	_		_	_		-	-	-	_	_	_	-	_
	Exposure Routes Total	0.7	1	0.04	0.00002	0.0001	0.000004	0.000005	0.0002	0.7	0.2	:	0.000001	0.00000	0.0001	0.0001	0.003	0.2	0.9		6.0	0.04
otient	Dermal	90:0	1	;	0.000007	0.000044	0.0000016	0.0000017	0.000087	90'0	0.014	1	0.0000004	0.0000031	0.000034	0.000044	0.00099	0.02	osure Routes	•	Total [Skin] HI =	system] HI =
Non-Carcinogenic Hazard Quotient	Ingestion Inhalation Dermal	-	1	0.0077	0.00000000000	0.0000000056	0.00000000000	1	0.00000000095	0.008	ļ	:	0.000000000003	0.0000000004	0.000000003	0.00000011	0.00000003	0.0000001	fedia and All Expe		Tota	Total [Nervous system] HI =
in-Carcinoge	Ingestion	0.64	ı	0.036	0.000013	0.000076	0.0000028	0.000003	0.00015	0.7	0.15	1	9900000000	0.00000055	0.000061	0.000077	0.0017	0.2	x Across All N			
Ž	Primary Target Organ	Skin		NOAEL (Nervous system)	Nervous system	Kidney	Nervous system	Liver	Kidney		Skin		Nervous system	Kidney	Nervous system	Liver	Kidney		Total Hazard Index Across All Media and All Exposure Routes			
Chemical		Arsenic	Iron	Manganese	C9-C12 Aliphatics	C9-C10 Aromatics	C9-C18 Aliphatics	C19-C36 Aliphatics	C11-C22 Aromatics	(Total)	Arsenic	lron	C9-C12 Aliphatics	C9-C10 Aromatics	C9-C18 Aliphatics	C19-C36 Aliphatics	C11-C22 Aromatics	(Total)				
	Exposure Routes Total	2E-06								2E-06	5E-07							5E-07	3E-06			
Carcinogenic Risk	Dermal	2E-07								2E-07	SE-08							SE-08	ire Routes	-		
Carcino	Inhalation Bermal	9E-10								9E-10	2E-10							2E-10	and All Exposi	•		
	Ingestion	2E-06								2E-06								5E-07	oss All Media			
Chemical		Arsenic								(Total)	Arsenic							(Total)	Total Risk Across All Media and All Exposure Routes			
Exposure		Area 3 - Industrial									Area 3 - Industrial					•						
Exposure		Surface Soil		•	•		-				Subsurface Soil											
Medium		Soil																				

1 - RID is based on NOAEL dose level. However, higher doses in study used to develop RID were associated with effects on the nervous system.

0.003

Total [Kidney] HI = Total [NOAEL] HI =

Total [Liver] HI =

- Therefore, the HQ for this chemical was included in the segregated HI for effects to the nervous system to provide a conservative estimate of the HI. 2 RfD is based on NOAEL dose level. However, higher doses in study used to develop RfD were associated with effects on the GI system.
 - Therefore, the HQ for this chemical was included in the segregated HI for effects to the GI system to provide a conservative estimate of the HI. Shaded value indicates a target organ-specife hazard index that exceeds the USEPA threshold hazard index value of 1, indicating that there is an
 - increased liklihood of adverse effects to this target organ/system.
- NOAEL No observable adverse effect level NA - No toxicity data
 - HQ Hazard quotient HI Hazard index

 - - No toxicity data

RISK ASSESSMENT SUMMARY AREA 3 - INDUSTRIAL - ADULT RESIDENT AOC 57 TABLE 13

REMEDIAL INVESTIGATION REPORT DEVENS, MASSACHUSETTS

Scenario Timeframe: Future Unrestricted Receptor Population: Resident Receptor Age: Adult

	Exposure Routes Total	60'0	0.00	0.00003	0.0002	0.00001	100000	0,000	1.0	0.02	0.0	0.00000	0.00001	1000'0	0.0002	0,004	0.03	0.005		0.5	ı	6,5	0.003	0.005	0.03	0.2	0.03	0.007	0.28	5	s		10 Personal Property of the Control	0.5	0.2	0.8	0.5
ilent		0.012	1 1	0.000013	0.000083	0.0000031	0.0000032	0.00017	0.01	0.0027	ı	0.0000007	9000000	0.000066	0.000083	0.0019	0.005	Ϋ́Х	YY Y	٧×	¥.	¥	¥	V.	Ϋ́	¥.	¥ X	Š	ΑN	0.0	sure Routes	1	Total Skdn HI =	vstem] HI =	Total (Liver) HI =	Total (Kidney) HI =	Total [NOAEL] HI =
Non-Carcinogenic Hazard Quotten	Ingestion Inhalation Dernial	-	0 00088	90000000000	0.00000000064	100000000000	ı	0.000000011	0.0009		1	0.00000000003	0.0000000000	0.0000000031	;	0.0000001200	0.0000001	ΨN	NA	Ϋ́	ΝĄ	¥	ΑN	٧×	Ϋ́Α	¥Z	Ϋ́	¥	Ϋ́Α	0.0	Total Hazard Index Across All Media and All Exposure Routes		Total	Total (Nervous system) HI	Total	Total ik	Total [N
on-Carcinog	ingestion	0.08	0 0045	0.000016	0.000095	0.0000036	0.0000037	0.00019	0.08	610'0	ı	0.00000082	0.0000068	0.000076	0.000097	0.0022	0.02	0.0052	n	0.48	1	0.53	0.003	0.0051	0.027	0.18	0.027	0.0071	0.28	\$	x Across All M						
Z	Primary Target Organ	Skin	Iv	NOALL INGVOIS SYSTEM	Kidney	Nervous system	Liver	Kidney		Skin		Nervous system	Kidney	Nervous system	Live	Kidney		NOAEL	Skin	Kidney		NOAEL (Nervous system)	NOAEL	NOAEL	Live	Live	Live	Liver	Kidney		Total Hazard Inde						
Chemical		Arsenic	Iroa	Co.C.12 Alinhatics	C9-C10 Aromatics	C9-C18 Aliphatics	C19-C36 Aliphatics	C11-C22 Aromatics	(Total)	Arsenic	Iron	C9-C12 Aliphatics	C9-C10 Aromatics	C9-C18 Aliphatics	C19-C36 Aliphatics	C11-C22 Aromatics	(Total)	Aluminum	Arsenic	Cadmium	Iron	Manganese	1,2-Dichlorobenzene	1,4-Dichlorobenzene	Naphthalene	Carbon Tetrachloride	Chloroform	Tetrachloroethane	C9-C10 Aromatics	(Total)							
	Exposure Routes Total	1E-05							1E-05	3E-06							3E-06	F - 6R.04 - 17-3	2F-06	0E+00	7E-06	78-07	2E-06							6E-04	6E-04						
Carcinogenic Risk	Dermal	2E-06							2E-06	4E-07	!						4E-07													0E+00	re Routes						
Carchit	Inhalation	SE-09							SE-09	1E-09	!						1E-09													0E+00	d All Expos						
	Ingestion	1E-05							IE-05	3E-06	l l						3E-06	VE-04	90 110		7E-06	7E-07	2E-06							6F-04	s All Media a						
Chemical		Arsenic						7.1.	(Total)	remir						,	Carol	, and a second	A Dichlosohaman	Varbibalene	arbon Tetrachloride	Thomban	Cetrachloride							Total	Total Rick Across All Media and All Exposure Routes						
Exposure		Area 3 - Industrial A								Area 3 - Industrial								1	_			<u>, c</u>	<u> </u>	•													
Exposite		Surface Soil								Cathanafana Cail	100 20 THE PORT								Croimawaica																		
Medium		Soil									-						one of		Croundwater															-			

1. RD is based on NOAEL dose level. However, higher dosts in study used to develop RLD were associated with effects on the narrous system.

Therefore, the RQ for this chemical was included in the segregated HI for effects to the CI system to provide a conservative estimate of the HI.

Therefore, the RQ for this chemical was included in the segregated HI for effects to the CI system as nowledge a conservative estimate of the HI.

Therefore, the HQ for this schemical was included in the segregated HI for effects to the CI system as nowledge a conservative estimate of the HI.

Therefore, the HQ for this schemical was included in the segregated HI for effects to the CI system to conservative estimate of the HI.

Shaded value indicates as uccess the large organ/system.

Shaded value indicates as access lifetime cancer risk that exceeds the upper-bound of the USEPA cancer risk range (Ix10⁴ to Ix10⁴)

NA.- No toxicity data

NOAEL. No observable adverse effect level
HQ. Hazard index

HI. Hazard index

— No toxicity data

RISK ASSESSMENT SUMMARY AREA 3 - INDUSTRIAL - CHILD RESIDENT TABLE 14 AOC 57

REMEDIAL INVESTIGATION REPORT DEVENS, MASSACHUSETTS

Scenario Timeframe: Future Unrestricted Receptor Population: Resident Receptor Age: Child

		_	_			_				-		_					_		_	_		,	_
	Exposure Routes Total	_	ı	0.04	0.0004	0.003	0.0001	0.0001	0.005	1	0.2	ı	0.00002	0.0002	0.0021	0.0026	0.06	0.3	1		1	0.05	0.003
otient	Dermal	0.24	ı	ı	0.00028	0.0017	0.000063	0.000066	0.0034	0.2	0.056	1	0.0000150	0.00012	0.0014	. 0.0017	0.039	0.1	sure Routes	a	Total [Skin] HI -	system HI =	Total [Liver] HI =
Non-Carelbogenic Hazard Quotient	Ingestion Inhalation	ı	1	0.002	0.0000000014	0.000000015	0.0000000003	ı	0.000000025	0.002	1	1	0.00000000000	0.0000000000	0.0000000000	1	0.00000028	0.0000003	edia and All Expe		Tota	Total [Nervous system] HI =	Total
on-Careinoge	Ingestion	0.75	ı	0.042	0.00015	0.00089	0.000033	0.000035	0.0018	9.0	81.0	1	0.0000077	0.000064	0.00071	60000	0.02	0.2	x Across All M				
N.	Primary Target Organ	Skin		NOAEL (Nervous system)	Nervous system	Kidney	Nervous system	Liver	Kidney	. 4 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Skin		Nervous system	Kidney	Nervous system	Liver	Kidney		Total Hazard Index Across All Media and All Exposure Routes				
Chemical		Arsenic	Iron	Manganese	C9-C12 Aliphatics	C9-C10 Aromatics	C9-C18 Aliphatics	C19-C36 Aliphatics	C11-C22 Aromatics	(Total)	Arsenic	Iron	C9-C12 Aliphatics	C9-C10 Aromatics	C9-C18 Aliphatics	C19-C36 Aliphatics	C11-C22 Aromatics	(Total)		.			
	Exposure Routes Total	4E-05								4E-05	9E-06							9E-06	5E-05				
Carcinogenic Risk	halation Dermal	1E-05								1E-05	2E-06							2E-06	re Routes	4			
Carcino		3E-09								3E-09	6E-10							6E-10	and All Exposure Routes				
	Ingestion	3E-05								3E-05	7E-06							7E-06	ss All Media				
Chemical		Arsenic								(Total)	Arsenic						•	(Total)	Total Risk Across All Media and				
Exposure		Area 3 - Industrial									Area 3 - Industrial												
Exposure		Surface Soil									Subsurface Soil												
Medium		Soil			•															-			

Therefore, the HQ for this chemical was included in the segregated HI for effects to the nervous system to provide a conservative estimate of the HI. 1 - RfD is based on NOAEL dose level. However, higher doses in study used to develop RfD were associated with effects on the nervous system.

Total [Kidney] HI -Total [NOAEL] HI =

- 2 RID is based on NOAEL dose level. However, higher doses in study used to develop RID were associated with effects on the GI system.
- Therefore, the HQ for this chemical was included in the segregated HI for effects to the GI system to provide a conservative estimate of the HI. Shaded value indicates a target organ-specific hazard index that exceeds the USEPA threshold hazard index value of 1, indicating that there is an increased likithood of adverse effects to this target organ/system.
 - - NA No toxicity data

NOAEL - No observable adverse effect level

- HQ Hazard quotient HI Hazard index
- = No toxicity data

TABLE 15 RISK ASSESSMENT SUMMARY AREA 3 - RECREATIONAL - RECREATIONAL VISITOR AOC 57

REMEDIAL INVESTIGATION REPORT DEVENS, MASSACHUSETTS

Scenario Timeframe: Current/Future Receptor Population: Recreational visitor Receptor Age: Child (ages 6 through 16)

:::		T							-	П	Г		-		-	_	-	-	٦			_			-	-	;	7	7	T	7	٦	П	П	П	П	Γ
	Routes Tetal	0.1	0.001	60000	0.008	90'0	0.007	00	6.0	0.5	0.07	0.1	9000'0	0.00003	0.0004	0.0002	0.0003	0.03	0.2	0.003	90'0	0.001	0.002	•	0.002	0.00002	0,00008	0.1	0.7		6.7	0.02	10.0	9.4	100'0	0.1	
	Dermal	0.042	1	ı	0.0067	0.055	0.0058	0.0089	0.28	0.4	0.055	0.11	ı	0.000025	0.00039	0.00015	0.00028	0.025	0.2	0.0018	0.01	1100.0	0.0012	!	ı	1	-	0.01	sure Routes] = *** (*******************************	- Tur imperi	system] HI =	Total [Liver] HI =	Total [Kidney] HI =	scular] HI =	system] HI =	- 111 (121 () () () () ()
	Inhalation	Ϋ́	٧×	Ϋ́	٧N	٧X	ΝΑ	ž	٧×	0.0	ΑN	٧X	٧×	٧×	٧×	٧×	٧×	NA	0.0	٧٧	٧×	٧	¥ Z	NA V	٧	¥Z	VV.	0.0	a and All Expo	8		Total [Nervous system] HI =	Total	Total [I	Total [Cardiovascular] HI =	Total [immune system] HI =	
	Ingestion	0.035	0.001	0.000	960000	0.0075	0.00081	0.0012	0.039	0.1	0.012	0.0039	19000'0	0.00000087	0.000013	0.0000052	860000000	0.00087	0.02	0.0014	0.05	0.00039	0.00038	,	0.0021	0.000018	0.000081	0.05	cross All Medi			۲-	٠			۲	
	Primary	Skin	Live	NOAEL (Nervous system)	Nervous system	Kidney	Nervous system	Liver	Kidney		Skin	Immune system	NOAEL (Nervous system)	Nervous system	Kidney	Nervous system	Liver	Kidney		NOAEL	Skin	Cardiovascular	NOAEL (Nervous system)	NOAEL	Kidney	Liver	Kidney		Total Hazard Index Across All Media and All Exposure Routes								
		Arsenic	Dieldrin	Mangarese	C9-C12 Aliphatics	C9-C10 Aromatics	C9-C18 Alinhatics	C19_C36 Alinhatice	C11-C22 Aromatics	(Total)	Arsenic	Aroclor-1260	Manualese	C9-C12 Aliphatics	C9-C10 Aromatics	C5-C8 Aliphatics	C19-C36 Aliphatics	C11-C22 Aromatics	(Total)	Antimony	Arsenic	Barium	Manganese	Benzo(k)fluoranthene	C11-C22 Aromatics	C19-C36 Aliphatics	C9-C10 Aromatics	(Total)									
	Exposure.	SE-06	15-07							SE-06	5E-06	78-07	:						6E-06	4E-06	3E-07							4E-06	1E-05								
	Dermal	38-06	1							3E-06	4E-06	78-07							\$E-06	76-07	3E-07							1E-06	re Routes								
	Ingestion Inhalation Bernal	ž	Ą	ŀ						0E+00	ΥN	¥X	:						0E+00	AN	×							0E+00	nd All Exposu								
	Ingestion	2E-06	1E-07	:						2E-06	8F-07	30.40	1						8E-07	3E-06	16-09							3E-06	s All Media a								
		Arcenic	Dieldrin							(Total)	Arconic	Amelor-1960	2001						(Total)	Arcmic	Benzo(k)fluoranthene)						•	(Total)	Total Risk Across All Media and All Exposure Routes								
		Ares 1 - Recrestional									Arms 7 Decreational	THE PART OF THE PA								Ares 3 - Berrestional																	
		Curface Coil									Continued to									Curfine uniter																	
		15-3	700								,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	Sediment								Section 1	Surface water																

Therefore, the HQ for this chemical was included in the segregated HI for effects to the nervous system, Therefore, the HQ for this chemical was included in the segregated HI for effects to the nervous system to provide a conservative estimate of the HI.

2. RID is based on NOAEL dose level. However, higher doses in simply used to develop RD was essectation with effects on the System. Therefore, the HQ for this chemical was included in the segregated HI for effects to the CI system to provide a conservative estimate of the HI. Standed value indicates it urget organ-specife hazard index cital exceeds the USEPA threshold hazard index value of 1, indicating that there is an increased likelihood of adverse effects to this urget organ-specife.

NA - No toxicity data
NOAEL - No observable adverse effect fevel
HQ - Hazard quotient
HI - Hazard index
- = No toxicity data

TABLE 16 RISK ASSESSMENT SUMMARY AREA 3 - RECREATIONAL - CONSTRUCTION WORKER AOC 57

REMEDIAL INVESTIGATION REPORT DEVENS, MASSACHUSETTS

Scenario Timeframe: Future Receptor Population: Construction worker Receptor Age: Adult

		_	-	-	==		_	_		-	-	=	_	_		-	_	_	_
	Exposure Routes Total	0.5	0:0	0.01	0.00186	0.0148	0.0016	0.0025	0.08	9.0	0.5	0.5	1		1	0.02	0.02	0.1	0.01
otient	Dermal	0.041	ı	;	0.00066	0.0054	0.00057	0.00088	0.028	0.1	0.042	0.04	sure Routes	_	Total [Skin] HI -	system] HI =	Total [Liver] HI =	Total [Kidney] HI =	Total [NOAEL] HI =
Non-Carcinegenic Hazard Quotient	Ingestion Inhalation	1	ł	0.0024	0.000000051	6900000000	0.000000045	1	0.000003	0.002	1	0	ia and All Expo		Tota	Total [Nervous system] HI =	Total	Total [Total [N
п-Сагсіподен	Ingestion	0.44	0.013	0.011	0.0012	0.0094	0.001	0.0016	0.049		0.44	0.4	Across All Med			-			
Ž	Prímary Target Organ	Skin	Liver	NOAEL (Nervous system) ¹	Nervous system	Kidney	Nervous system	Liver	Kidney		Skin		Total Hazard Index Across All Media and All Exposure Routes						
Chemical		Arsenic	Dieldrin	Manganese	C9-C12 Aliphatics	C9-C10 Aromatics	C9-C18 Aliphatics	C19-C36 Aliphatics	C11-C22 Aromatics	(Total)	Arsenic	(Total)		=1					
	Inhalation Bermal Exposure Routes Total	1E-06	7E-07							2E-06	1E-06	1E-06	3E-06						
genic Risk	Dermal	1E-07	1							1E-07	1E-07	1E-07	re Routes	<u> </u>					
Carcinogenie Risk	Inhalation	6E-10	3E-12							6E-10	6E-10	6E-10	and All Exposu						
	Ingestion	1E-06	7E-07	!						2E-06	1E-06	1	se All Media						
Chemical		Arsenic	Dieldrin							Total	Arcenic	CTotal	Total Rick Across All Media and All Exnosure Boutes	TOTAL WINDS					
Exposure	rome	Area 3 - Recreational									Ares 3 - Recreational	- C #010							
Exposure	Medium	Surface Soil									Cubanefora Coil	Subsuitace 3011							
Medium		100	100																

Motor

1 - R.D is based on NOAEL dose level. However, higher doses in study used to develop R.D were associated with effects on the nervous system.

Therefore, the HQ for this chemical was included in the segregated HI for effects to the nervous system to provide a conservative estimate of the HI.

2 - RID is based on NOAEL dose level. However, higher doses in study used to develop RID were associated with effects on the GI system.

Therefore, the HQ for this chemical was included in the segregated HI for effects to the CI system to provide a conservative estimate of the HI. Shaded value indicates a target organ-specific hazard index that exceeds the USEPA threshold hazard index value of 1, indicating that there is an increased likithood of adverse effects to this target organ/system.

Mr. Annihila data

NA - No toxicity data

NOAEL - No observable adverse effect level

HQ - Hazard quotient HI - Hazard index

RISK ASSESSMENT SUMMARY AREA 3 - RECREATIONAL - ADULT RESIDENT AOC 57 TABLE 17

REMEDIAL INVESTIGATION REPORT DEVENS, MASSACHUSETTS

Scenario Timeframe: Future Unrestricted Receptor Population: Resident Receptor Age: Adult

	Exposure. Routes Total:	0.1	0.002	0.002	0.003	0.02	0.002	0.004	0.1	0.2	90'0	90.0	1 2 8 × 2 1 1	0.07	0	0.003	0.02	0.07	0.02	0.02	6,4	0.04	0.002	0.2	80	6	Secretary Management	**************************************	6.4	0.2	0.3
tlent	Dermial	6,0000	;	,	0.0013	10:0	0.0011	0.0017	0.053	80.0	0.0079	0.008	NA	¥	NA AN	NA AN	Ϋ́	۷ Z	ΥN	¥	Ϋ́	٧	¥	Ϋ́	0	sure Routes		Total (Skin) HI	system] HI =	Total [Liver] HI =	Total [Kidney] HI =
Non-Carcinogenie Razard Quatient	Infiniation Dermal		;	0.00027	0.000000059	0.00000079	0.000000051	ı	0.0000035	0.0003		0	NA	¥	ΑN	¥	Ϋ́	ΑN	NA	ΑN	NA	NA A	NA	NA	0	Total Hazard Index Across All Media and All Exposure Routes	1	Tota	Total [Nervous system] HI =	Total	Total [F
on-Carcinog	Ingestion	0.055	0.0016	0.0014	0.0015	0.012	0.0013	0.002	0.061	0.1	0.055	90'0	1.7	. 0.067	;	0.0025	0.018	0.071	0.015	0.017	0,39	0.041	6100.0	0.16	8	x Across All N		-			
Ż	Primary Target Organ	Skin	Liver	NOAEL (Nervous system)	Nervous system	Kidney	Nervous system	Liver	Kidney		Skin		Skin	NOABL		NOAEL	Liver	Liver	Liver	Liver	NOAEL (Nervous system)	Nervous system	Nervous system	Kidney		Total Hazard Inde					
Chemical		Arsenic	Dieldrin	Manganese	C9-C12 Aliphatics	C9-C10 Aromatics	C9-C18 Aliphatics	C19-C36 Aliphatics	C11-C22 Aromatics	(Total)	Arsenic	(Total)	Arsenic	Aluminum	ron	1,4-Dichlorobenzene	Naphthalene	BEHP	P.G.	TCE	Manganese	CS-C8 Aliphatics	C9-C12 Aliphatics	C9-C10 Aromatics	(Total)						
	Exposure Routes Total	96-06								98-06	9E-06	9B-06		8E-07		0E+00	-			•					1E-03	1E-03					
Carcinogente Risk	Dermat	1E-06	1							1E-06	1E-06	1E-06	Ϋ́	×	×	ž	¥	ž							0E+00	ure Routes					٠.
Carcin	Inhalation	3E-09	2E-11	:						3E-09	3E-09	3E-09	ž	Ϋ́	×	Y.	¥	Y.							0E+00	nd All Expos					
	Ingestion Inhalation Dermal	8E-06	4E-07	; !						8E-06	8E-06	8E-06	1E-03	8E-07	8E-06	t	3E-06	SE-07							1E-03	s All Media a					
Chemical		Arenic	Dieldrin							(Total)	Arsenic	CTotal	Arsenic	1.4-Dichlorobenzene	ВЕНР	Naphthalene	PCE	TCB	ŀ						Clota	Total Risk Across All Media and All Exposure Routes					
Exposure	rome	Area 1 - Recreational									Area 3 - Recreational		Ares 3 - Recreational																		
Exposure	Medium	Curface Coil	100 201 100								Subsurface Soil		Gmundwater	1																	
Medium			301										- denotation of the	-																	-

1 - R.D. is based on NOAEL dose level. However, higher doses in study used to develop R.D were associated with effects on the mervous system.

Therefore, the HQ for this chemical was included in the segregated HI for effects to the nervous system to provide a conservative estimate of the HI.

2 - R.D. is based on NOAEL dose level. However, higher doses in study used to develop R.D were associated with effects on the GI system.

Therefore, the HQ for this chemical was included in the segregated HI for effects to the GI system to provide a conservative estimate of the HI.

Shaded value indicates a larged organ-specific hazard index or chemical-specific hazard quotient that exceeds the USEPA threshold hazard index value of 1, indicating that there is an

Shaded value indicates an excess lifetime cancer risk that exceeds the upper-bound of the USEPA cancer risk range (1x10⁴ to 1x10⁴) NA - No toxicity data
NOAEL - No observable adverse effect level
HQ - Hazard quotient increased likilhood of adverse effects to this target organ/system.

HI - Hazard index

-- = No toxicity data BBHP - bis(2-chylhexyl)phthalate TCE - Trichloroethene PCE - Tetrachloroethene

RISK ASSESSMENT SUMMARY AREA 3 - RECREATIONAL - CHILD RESIDENT TABLE 18 A0C 57

REMEDIAL INVESTIGATION REPORT **DEVENS, MASSACHUSETTS**

Scenario Timeframe: Future Unrestricted Receptor Population: Resident Receptor Age: Child

		ermal Exposure Routes Total	0.16 0.7	0.02	0.01	0.026 0.04	0.21 0.3	0.023 0.04	0.035 0.05	1.1	2 3	0.16 0.68	0.2	Routes 3	'n] HI = 1	m] HI = 0.1	ir] HI = 0.1	Total [Kidney] HI = 医验验交叉系统证
	ron-Carcinogenic nazaru Quonein	Inhalation Dermal	-	1	0.00063	0.00000014 0.0	0.0000018	0.00000012 0.0	;	0.00000	9000'0		0.0	Total Hazard Index Across All Media and All Exposure Routes	Total [Skin] HI	Total [Nervous system] HI -	Total [Liver] HI =	Total [Kidne)
	Source - Carcon	Ingestion	0.51	0.015	0.013	0.014	0.11	0.012	0.018	0.57	-	0.52	0.5	K Across All A				
1	2	Primary Target Organ	Skin	Liver	NOAEL (Nervous system)	Nervous system	Kidney	Nervous system	Liver	Kidney		Skin		Total Hazard Inde				
	Chemical		Arsenic	Dieldrin	Manganese	C9-C12 Aliphatics	C9-C10 Aromatics	C9-C18 Aliphatics	C19-C36 Aliphatics	C11-C22 Aromatics	(Total)	Arsenic	(Total)					
		Inhalation Dermal Exposure Routes Total	3E-05	1E-06							3E-05	3E-05	3E-05	SE-05				
	Carcinogenic Risk	Dermal	6E-06	;							6E-06	6E-06	6E-06	ure Routes				
	Carcino	Inhalation	2E-09	18-11							2E-09	2E-09	2E-09	nd All Expos				
		Ingestion	2E-05	1E-06	:						2E-05	2E-05	2E-05	s All Media a				
	Chemical	1	Arsenic	Dieldrin							Total	Arcenic	(Total)	Total Risk Across All Media and All Exposure Routes				
	Exposure		Area 3 - Recreational									Cubangan Coil Area 3 . Decreational	- 1250 Carronna					
	Exposure	Medium	Curface Coil									Culturafica Coil	Suosmittee South					
	Medium		1.00	100		-									-	-		

1 - R.D is based on NOAEL dose level. However, higher doses in study used to develop R.D were associated with effects on the nervous system.

Total [NOAEL] HI =

- Therefore, the HQ for this chemical was included in the segregated HI for effects to the nervous system to provide a conservative estimate of the HI.
 - 2 RID is based on NOAEL dose level. However, higher doses in study used to develop RID were associated with effects on the GI system.
- Shaded value indicates a target organ-specific hazard index or chemical-specific hazard quotient that exceeds the USEPA threshold hazard index value of 1, indicating that there is an Therefore, the HQ for this chemical was included in the segregated HI for effects to the GI system to provide a conservative estimate of the HI.
 - increased liklihood of adverse effects to this target organ/system.
 - Shaded value indicates an excess lifetime cancer risk that exceeds the upper-bound of the USEPA cancer risk range (1x10° to 1x10°)
 - NA No toxicity data
- NOAEL No observable adverse effect level
 - HQ Hazard quotient
- -- No toxicity data

ECOLOGICAL RISK ASSESSMENT

- O-1 EXPOSURE AND EFFECTS ASSUMPTIONS CPCs
- O-2 ECOLOGICAL RISK CALCULATIONS
- O-3 ECOLOGICAL RISK CALCULATIONS FOR CPCs SUPPORTING INFORMATION
- O-4 ECOLOGICAL RISK CALCULATIONS FOR NON-CPCs SUPPORTING INFORMATION
- O-5 STATISTICAL ANALYSIS OF TOXICITY TESTING (MIDGE GROWTH)

O-1 EXPOSURE AND EFFECTS ASSUMPTIONS FOR CPCs

Remedial Investigness Reported Diet Bovens, Mass	Table O-1.1 Exposure Parameters for Representative Wildlife Species AOC 57	Vildlife Species			
Meight (kg) O.040 [a] Seeds and some insects [a] 88% O.017 [a] Earthworms, slugs, snails, fungi, insects, and vegetation [b] 10% Vegetation [b] Cattails, reeds, pondweeds, 80% Dulrushes, water lillies, freshwater clams, and other small 10% aquatic animals [f] 57% O.077 [i] Fruits and invertebrates [j]. 57% ayunter. Breeding females at gasses, rice, insects, gastropods, insects, crustaceans, and annelids [a] 509 A.69 [q] Small mammals, birds, and 579 invertebrates, as well as 209 invertebrates, as well as 209 invertebrates, as well as 209 invertebrates, as well as 209 berries and other fruits. [a] 109 97%	Remedial Investigation Report Devens, Massachusetts				
0.040 [a] Seeds and some insects [a] (1.27 [a] Earthworms, slugs, snails, fungi, insects, and vegetation [b] (1.27 [e] Cattails, reeds, pondweeds, bulrushes, water lillies, freshwater clams, and other small aquatic animals [f] (1.134 [o] Primarily aquatic plants in winter. Breeding females eat grasses, rice, insects, gastropods, insects, crustaceans, and annelids [a] (1.69 [q] Small mammals, birds, and invertebrates, as well as berries and other fruits. [a]	Diet Assumed Diet for Exposure Assessment (% of diet)	Food Ingestion Rate (kg/day)	Water Intake Rate (¢ /day)	Exposure Duration	Home Range (acres)
fungi, insects, and vegetation [b] 1.27 [e] Cattails, reeds, pondweeds, bulrushes, water lillies, freshwater clams, and other small aquatic animals [f] 0.077 [i] Fruits and invertebrates [j]. 1.134 [o] Primarily aquatic plants in winter. Breeding females eat grasses, rice, insects, gastropods, insects, crustaceans, and annelids [a] 4.69 [q] Small mammals, birds, and invertebrates, as well as berries and other fruits. [a]		0.0049 [b]	0.0055 [c]	-	0.147 [d]
1.27 [e] Cattails, reeds, pondweeds, bulrushes, water lillies, freshwater clams, and other small aquatic animals [f] 0.077 [i] Fruits and invertebrates [j]. 1.134 [o] Primarily aquatic plants in winter. Breeding females eat grasses, rice, insects, gastropods, insects, crustaceans, and annelids [a] 4.69 [q] Small mammals, birds, and invertebrates, as well as berries and other fruits. [a]	snails, 7	0.0024 [b]	0.0025 [c]	y	0.96 ± 0.09 [a]
0.077 [i] Fruits and invertebrates [j]. 1.134 [o] Primarily aquatic plants in winter. Breeding females eat grasses, rice, insects, gastropods, insects, crustaceans, and annelids [a] 4.69 [q] Small mammals, birds, and invertebrates, as well as berries and other fruits. [a]		0.084 [b]	0.12 [c]		0.20 [h]
1.134 [o] Primarily aquatic plants in winter. Breeding females eat grasses, rice, insects, gastropods, insects, crustaceans, and annelids [a] 4.69 [q] Small mammals, birds, and invertebrates, as well as berries and other fruits. [a]		0.011 [1]	0.011 [m]	0.75 [v]	0.48 [n]
4.69 [q] Small mammals, birds, and invertebrates, as well as berries and other fruits. [a]		0.063 [1]	0.064 [m]	-	235 [p]
	2 , (3)	0.24 [b]	0.40 [c]	-	1,727 ± 339 [a]
See notes at end of table					

		Exposure Paramet	Table O-1.1 Exposure Parameters for Representative Wildlife Species AOC 57	Ilife Species			
		Re	Remedial Investigation Report Devens, Massachusetts				
Representative Wildlife Species	Body Weight (kg)	Reported Diet	Assumed Diet for Exposure Assessment (% of diet)	Food Ingestion Rate (kg/day)	Water Intake Rate (t /day)	Exposure Duration	Home Range (acres)
Raccoon (Procyon lotar)	3.99 [r]	Mostly fleshy fruits, nuts acorns, corn; also frogs, crayfish, and insects [a]	Sediment Exposures: 91% Crayfish and other aquatic invertebrates 9% Sediment [k] Floodplain Exposures: 56% Plants 14% Invertebrates 19% Mammals 2% Birds 9% Soil [k]	0.214 [b]	0.344 [c]	v-	385 [s]
Barred owl (Strix varia)	0.72 [t]	Mice (staple) and other small mammals, frogs, birds, insects, crayfish, [f]	80% Small mammals 12% Small birds 3% Invertebrates 5% Soil [g]	0.047 [1]	0.047 [m]	-	565 [f]
Great blue heron (Ardea herodias)	2.23 <u>+</u> 0.76 [a]	Mostly fish; some amphibians, crustaceans, and birds [a]	98% Fish and aquatic invertebrates 2% Sediment [g]	0.401 [1]	0.101 [m]	0.5 [v]	1.5 [u]
See notes at end of table							

Exposure Duration Intake Rate (e /dav) Water Food Ingestion Rate (kg/day) Exposure Parameters for Representative Wildlife Species AOC 57 Exposure Assessment Remedial Investigation Report Assumed Diet for Devens, Massachusetts (% of diet) **Table 0-1.1** Reported Diet Body Weight <u>\$</u> Representative Wildlife

Range (acres)

- [a] Wildlife Exposure Factors Handbook (USEPA, 1993a). Values for the cotton mouse and deer mouse are used for the white-footed mouse when not available. Mean
 - of means reported for male and female shrews in summer and fall.
 - Calculated using the mammal equation based on body weight (Wt.) in kg. Food ingestion (kg/day) = 0.0687 x Wt 0822 (kg) (USEPA, 1993a). Calculated using the mammal equation based on body weight (Wt.) in kg. Water ingestion (I/day) = 0.099 x Wt 0.90 (USEPA, 1993a).
 - Average for male and female deer mice, Virginia/mixed deciduous forest (USEPA, 1993a).
- Average of male and female muskrat body weights during winter in Tennessee (USEPA, 1993a).
 - DeGraaf & Rudis (1986)
- Estimated soil ingestion.
- Average of mean home range values for muskrats in early and late summer in Ontario Bay (USEPA, 1993a).
 - Mean year-round value for male and female robins in Pennsylvania (USEPA, 1993a).
- Average year-round values for robins in the eastern United States (USEPA, 1993a).
- The sediment ingestion for raccoons and mallards were estimated to be the same as their estimated soil ingestion. The soil ingestion rate for the robin was assumed to be the same as for American woodcocks, which ingest higher percentages of soil because of their relatively high dietary composition of earthworms (USEPA
 - Calculated using the bird equation based on body weight (Wt.) in kg. Water ingestion (i/day) = 0.059 x Wt 0.87 (kg) (USEPA, 1993a). ΞΞ
 - Average of mean home range values provided for robins feeding nestlings and fledglings (USEPA, 1993a).
 - Average of mean body weights for male and female mallards throughout North America (USEPA, 1993a). Average of male and female mallard home ranges in Minnesota wetlands and rivers (USEPA, 1993a). ZZZZZZZZZZZZZ
 - Average of adult male and female foxes in spring (USEPA, 1993a).
- Median of mean weights for male and female raccoons in Alabama (USEPA, 1993a).
- Average of adult male and female raccoons from May to December (USEPA, 1993a)
 - Midpoint of average for male and female owls (Terres, 1987).
 - Size of heron feeding territory in summer (USEPA, 1993a)
- The exposure durations for the robin and heron are less than 1 due to decreased foraging capabilities (i.e., robins increase their berry consumption and decrease their earthworm consumption in the winter) and/or migration during winter (i.e., inability of heron to forage in stream during frozen wintertime conditions).

g = grams

kg = kilograms

kg/day = kilograms per day

e /day = liters per day

NA = not applicable

Table O-1.2 Summary of Bioaccumulation and Bioconcentration Data **AOC 57**

Remedial Investigation Report Devens, Massachusetts

			Devens, M	assachusetts		and the second s		
				Bioaccum				Bioconcentration
		n i elle val		Factor	[a]			Factor [a]
Analyte	log K _{ow} [b]	Terrestrial Invertebrate [c]	Terrestrial Plant [d]	Mammal [c]		Aquatic [g] Invertebrate	Aquatic Plant	Fish
INORGANICS				<u> </u>				
Aluminum	NA	7.5E-02 [h]	8.0E-04 [i]	7.5E-02 [i]	7.5E-02	7.5E - 02	6.0E - 03 [k]	9.5E+01 [l]
Antimony	NA	5.0E-02 [h]	4.0E-02 [i]	5.0E-02 [j]	5.0E-02	[m]	[m]	[m]
Arsenic	NA	6.6E-03 [n]	3.0E-01 [o]	1.0E-01 [j]	6.0E - 03	6.6E-03	3.0E-01 [o]	2.8E+02 [p]
Beryllium	NA	5.0E-02 [h]	2.0E-03 [i]	5.0E-02 [i]	5.0E-02	[m]	[m]	[m]
Barium	NA	7.5E-03 [h]	3.0E-02 [i]	7.5E-03 [i]	7.5E - 03	7.5E-03	2.5E - 02 [k]	4.0E+00 [p]
Cadmium	NA	1.4E+00 [q]	3.3E+01 [r]	2.1E+00 [j]	3.8E - 01 [s]	1.4E + 00	4.1E-01 k	3.2E+02 [i]
Chromium	NA	1.6E-01 [p]	1.5E-03 [i]	2.8E-01 [j]	2.8E-01	1.6E-01	6.3E - 03 [k]	2.0E+02
Cobalt	NA	1.0E+00 [h]	4.0E~03 [i]	1.0E+00 [j]	1.0E+00	1.0E + 00	9.3E - 03 [k]	[m]
Copper	NA	1.6E-01 [t]	7.8E-01 [u]	6.0E - 01[r]	6.0E - 01	1.6E - 01	6.0E - 02 [k]	3.4E+02 [1]
Lead	NA	7.8E - 02[v]	9.0E-03 [i]	1.5E-02 [i]	1.5E-02	7.8E - 02	5.6E-02 [w]	1.5E+02 [l]
Manganese	NA	2.0E-02 [h]	5.0E-02 [i]	2.0E-02 [j]	2.0E - 02	2.0E-02	1.3E - 01 [k]	1.7E+03 [l]
Mercury	NA	6.8E - 02 [x]	1.8E-01 [i]	1.0E-02 [y]	2.3E+00	1.7E+01 [z]	2.4E-01 [k]	6.3E+04 [p]
Nickel	NA	2.3E-01 [aa]	1.2E-02 [i]	3.0E-01 [j]	3.0E-01	2.3E-01	1.4E-02 [w]	[m]
Selenium	NA	7.6E-01 [n]		7.5E-01 [j]	5.1E-01 [ac]	7.6E - 01	1.6E-01 [k]	8.3E+00 [p]
Vanadium	NA	1.3E-01 [h]	1.1E-03 [i]	1.2E-01 [j]	1.2E-01	1.3E-01	1.1E-03 [i]	1.0E-02 [p]
Zinc	NA	1.8E+00 [t]	6.1E-01 [r]	2.1E+00 [j]	2.1E+00	1.8E + 00	9.2E-01 [k]	2.3E+02 [l]
			. ,					
PESTICIDES/PCBs]
4,4'~DDD	6	3.3E+00 [ad]	1.0E-02 [ae]	1.2E+00 [af]	2.9E+00 [ag]	2.1E+01 [ah]	1.0E-02 [ae]	
4,4'-DDE	5.7	1.7E+00 [ad]	1.0E-02 [ae]	1.2E+00 [af]	2.9E+00 [ag]	2.1E+00 [ah]	1.0E-02 [ae]	
4,4'-DDT	6.4	5.7E-01 [ad]	1.0E-02 [ae]	1.2E+00 [af]	2.9E+00 [ag]	2.1E+00 [ah]	1.0E-02 [ae]	
Aroclor-1242	4.1 [ai]	5.8E+00 [t]	1.2E-01 [aj]	3.8E+00 [ak]	3.2E-01 [al]	5.8E+00 [t]	1.2E-01 [aj]	
Aroclor-1260	7.1 [ai]	5.8E+00 [t]	1.2E-01 [aj]		3.2E - 01 [al]	5.8E+00 [t]	1.2E-01 [aj]	
alpha-Chlordane	5.5	1.6E+00 [ar]	5.1E-03	5.5E-01 [as]	1.8E+00 [at]	[m]	[m]	[m]
gamma-Chlordane	5.5	1.6E+00 [au]	5.1E~03		1.8E+00 [at]	[m]	[m]	[m]
Dieldrin	4.6	5.5E+00 [am]	1.7E - 02	1.5E+00 [an]	4.4E-01 [ao]	5.5E+00 [am]	1.7E - 02	[m]
SEMIVOLATILES 1,2-Dichlorobenzene	3.4 3.5	5.0E-02	7.3E-02	1.5E-01	1.5E-01	5.0E-02	7.3E-02	[m]
1,4-Dichlorobenzene	3.5 3.5	5.0E-02	7.3E - 02	1.5E - 01	1.5E - 01	5.0E - 02	7.3E - 02	[m]
2-Methylnaphthalene	-1.9 4.3	5.0E-02	2.5E - 02	1.5E - 01	1.5E-01	5.0E-02	2.5E-02	[m]
Acenaphthylene	4.1 4.3	5.0E-02	2.5E - 02	1.5E - 01	1.5E - 01	[m]	[m]	[m]
Benzo(b)fluoranthene	6.1 4.3	[m]	[m]	[m]	[m]	5.0E - 02	2.5E - 02	[m]
Benzo(k)fluoranthene	6.1 4.3	5.0E-02	2.5E-02	1.5E-01	1.5E - 01	5.0E - 02	2.5E-02	[m]
Bis(2-ethylhexyl)phthalate	5.1 5.2	5.0E-02	7.6E - 03	2.4E - 01	2.4E-01	5.0E-02	7.6E-03	3.1E+02 [p]
Chrysene	5.7 4.3	5.0E-02	2.5E - 02	1.5E-01	1.5E-01	5.0E-02	2.5E-02	[m]
Dibenzofuran	4.1 4.1	5.0E-02	3.3E-02	1.5E-01	1.5E-01	5.0E-02	3.3E-02	[m]
Di-n-butylphthalate	5.2 5.2	•	7.6E-03	2.4E-01	2.4E-01	5.0E-02	7.6E-03	[m]
Fluoranthene	4.95 [ap] 4.3	l	2.5E-02	1.5E-01	1.5E-01	5.0E-02	2.5E-02	[m]
Naphthalene	3.6 4.3	1	2.5E-02	1.5E-01	1.5E-01	5.0E-02 5.0E-02	2.5E-02	[m] 3.2E+02 [aq]
Phenanthrene	4.5 4.3	5.0E-02	2.5E-02	1.5E - 01	1.5E-01		2.5E-02 2.5E-02	
Pyrene	5.3 4.3	5.0E-02	2.5E - 02	1.5E-01	1.5E - 01	5.0E-02	2.3E-02	[m]
TYOU ATTY FO		1						
VOLATILES	20	BT A	NT A	NA	NA	NA	NA	NA
1,2-Dichloroethylenes	2.0	NA NA	NA NA	NA NA	NA NA	[m]	[m]	[m]
1,1,1—Trichloroethane	2.5	NA NA	NA NA	NA NA	NA NA	linj NA	NA	NA
Acetone	2.1			[m]	[m]	NA NA	NA NA	[m]
Benzene Carbon disulfide	2.1	[m]	[m] [m]	[m]	[m]	[m]	[m]	NA
Carbon disultide Chlorobenzene	2.8	[m] NA	NA	NA	иц NA	NA	NA	NA NA
Chloroform	2.0	NA NA	NA NA	NA NA	NA NA	NA NA	NA NA	NA NA
Ethylbenzene	3.2	NA NA	NA	NA	NA	NA	NA	NA
Methylene chloride	1.3	NA NA	NA NA	NA	NA	NA	NA	NA
Tetrachloroethylene	3.4	NA NA	NA	NA	NA	NA NA	NA	NA
Toluene	2.79	NA NA	NA NA	NA	NA NA	NA NA	NA	NA
Trichloroethylene	2.79	NA NA	NA	NA	NA NA	NA	NA	NA
Trichlorofluoromethane	2.5	NA NA	NA	NA	NA	NA	NA	NA
Xylenes	3.2	NA_	NA	NA	NA	NA	NA	NA
Ayienes	3.4	INA	INT	147.7	7.427	7.11.7	4 35 4	

NOTES:

[a] Units for bioaccumulation factors (BAFs) are mg/kg fresh wt tissue over mg/kg dry wt soil for terrestrial invertebrates and plants, mg/kg fresh wt. tissue

Table O-1.2 Summary of Bioaccumulation and Bioconcentration Data AOC 57

Remedial Investigation Report

									Devens, M	assachusetts				
										Bioaccumu	ılation			Bioconcentration
	:				- 1					Factor	[a]			Factor [a]
1 2	2.5	Analyt	C			log K	[b]	Terrestrial	Terrestrial	Mammal [e]	Bird [f]	Aquatic [g]	Aquatic	Fish
		<u> </u>		· ·		<u> </u>		Invertebrate [c	Plant [d]			Invertebrate	Plant	

over mg/kg fresh wt. food for small mammals and small birds, and mg/kg fresh wt. tissue over mg/kg fresh wt. sediment for aquatic plants and organisms. No BAFs were calculated for VOAs since available evidence suggests that these analytes do not bioaccumulate. Units for bioconcentration factors (BCFs) are µg/kg fresh wt. tissue over µg/L water. BCFs are presented for only those analytes that are selected as surface water CPCs.

- [b] From Superfund Chemical Data Matrix (USEPA, 1993) unless otherwise noted. Log K_{ow}s for classes of semivolatile compounds were averaged to provide an average BAF value. Compounds were grouped accordingly: PAHs (4.3), phthalates (5.2), dibenzofuran (4.1), and dichlorobenzenes (3.5).
- [c] Average of earthworm BAFs for SVOCs (Beyer, 1990) converted from dry weight to wet weight assuming earthworm is 80% water, unless otherwise noted. When no earthworm data were available, the BAF for small mammals was used as a surrogate.
- [d] Plant BAF calclulated using the following equation presented by Travis and Arms (1988) unless otherwise noted:
- log (Plant Uptake Factor)=1.588-0.578 (log Kow). Converted from dry weight to wet weight plant concentration assuming 80% water content.
- [e] Calculated using the following equation in Travis and Arms (1988) for semivolatile organic analytes with log K_{ow}s > 5:
 log BTF (biotransfer factor) = log K_{ow} 7.6; result multiplied by average ingestion rates for non-lactating and lactating test animals to convert from BTFs to BAFs, and divided by a factor of 0.2 to convert from dry feed to fresh feed. There is an uncertainty involved in using this equation for PAHs because this study did not use any PAHs in the regression analysis. BAFs for analytes with log K_{ow}s <5 are assumed to be 0.15 because they are unlikely to bioaccumulate in animal tissue (Maughan, 1993).
- [f] Bioaccumulation data are generally lacking for avians. When no bird data were available, the BAF for small mammals was used as a surrogate.
- [g] Used to represent bioaccumulation from sediment to fish and aquatic invertebrates. Sediment BAFs are presented for only those analytes that were selected as sediment CPCs. When no aquatic BAF data were available, the BAF for terrestrial inverebrates was used as a surrogate.
- [h] Prey-specific value not available; value shown is small mammal BAF for this chemical.
- [i] Value from Baes et al. (1984) for leafy portions of plants multiplied by 0.2 to represent 80% water composition of plants.
- jj Value derived from biotransfer factors (BTFs), presented in Baes et al. (1984) for uptake into cattle. BTF converted to BAF by multiplying by food ingestion rate of 50 kg/day wet weight.
- [k] Aquatic plant BAFs derived from an uptake study (Cherry & Guthrie, 1979) with two sedge species, Andropogon virginicus and Cyperus retrofractus, that were exposed to contaminated sediment. Values were converted from dry weight plant tissue to wet weight by applying a factor of 0.2 (assuming plants are 80% water).
- [I] Geometric mean of BCFs obtained from AQUIRE (1994) and AWQC documents (calculated in Appendix O, Table O-1.4).
- [m] This receptor group is not likely to be exposed to this CPC. Receptor exposures to analytes detected in surface soil include terrestrial invertebrates, terrestrial plants, mammals, and birds. Receptor exposures to analytes detected in surface water and sediment include aquatic organisms, aquatic plants, small fish, semi—aquatic mammals, and semi—aquatic birds.
- [n] Average of values for industrial soils from Beyer and Cromatie (1987) multiplied by 0.2 to represent 80% water composition in earthworms.
- [o] Average of BAF values reported from Wang et al. (1984), Sheppard et al. (1985), and Merry et al. (1986).
- [p] From Barnthouse et al. (1988).
- [q] Mean of values reported for soil invertebrates in MacFadyen (1980) converted from dry weight to wet weight.
- [r] Mammal value for copper and plant value for cadmium from Levine et al., 1989.
- [s] Based on accumulation of cadmium in kidneys of European quail in Pimentel et al. (1984).
- [t] BCF for earthworms from Diercxsens et al. (1985).
- [u] Median of values reported from Levine et al. (1989).
- [v] Geometric mean of BAF values (fresh wt./dry wts) for worms and woodlice (USEPA, 1985). Fresh weight tissue concentrations calculated assuming 80% body water content.
- [w] Values for lead and nickel from Mudroch & Capobianco (1979) represent an average of BAFs from sediment in several lakes, rivers, and bays into water lilies. Values converted from dry weight plant tissue to wet weight by applying a factor of 0.2 (assuming plants are 80% water).
- [x] Uptake value (fresh wt./dry wt.) for earthworms from USEPA (1985) sludge document. Fresh weight tissue concentrations calculated assuming 80% body water [y] USEPA, 1985.
- [2] Based on the ranges of mercury concentrations in sediment and macroinvertebrates in an eight lake ecosystem in Sweden. Sediment concentrations ranged from 0.05 to 0.3 μg/g dry weight (mid point = 0.18 μg/g) and macroinvertebrate concentrations ranged from 0.02 to 6 μg/g dry weight (mid point = 3.01 μg/g). Based on these midpoints, a bioaccumulation factor of 16.7 was obtained.
- [aa] Value from nickel sludge document (USEPA, 1985) multiplied by 0.2 to represent 80% water composition of earthworms.
- [ab] Based on reported ratio of selenium in plant tissue and iron fly ash amended soil (Stoewsand et. al., 1978).
- [ac] Based on average of reported ratio of selenium in diet to liver, kidney, and breast tissue of chickens (Eisler, 1985).
- [ad] Geometric means of 4,4'-DDT [Davis (1968), Davis & Harrison (1966), Wheatley & Hardman (1968), Bailey et al. (1970), Cramp & Olney (1967), and Beyer & Gish (1980)], 4,4'-DDE [Davis (1968), Davis & Harrison (1966), Cramp & Olney (1967), Collett & Harrison (1968), Hunt & Sacho (1969), and Gish (1970)], and 4,4-DDD [Barker (1958), Davis (1968), Davis & Harrison (1966), Cramp & Olney (1967), Collett & Harrison (1968), Wheatley & Hardman (1968), Hunt & Sacho (1969), Bailey et al. (1970), Dimond et al. (1970), Gish (1970), and Beyer & Gish (1980)] reported for earthworms. Dry soil concentrations calculated assuming 10% moisture content in sandy-loam soils (Donahue et al., 1977).
- [ae] Geometric mean of 4,4'-DDT, 4,4'-DDD, and 4,4'-DDÉ BAFs (fresh wt/dry wt) reported for roots (carrot, potato, sugar beet), grains (corn, oats), and legumes (alfalfa) derived from USEPA (1985b) converted from dry weight to wet-weight per values provided by Suter (1993).
- [af] BAF for shrews and voles calculated using measured concentrations of DDT_R in stomach content and in whole body (Forsyth & Petrle, 1984).
- [ag] Whole-body pheasant BAF for 4,4'-DDT presented in USEPA (1985b); derived from Kenaga (1973).
- [ah] Amphipod to sediment mean biomagnification factor for total DDT in Lake Michigan and Lake Ontario (Evans et al., 1991).

Table O-1.2 Summary of Bioaccumulation and Bioconcentration Data AOC 57

Remedial Investigation Report Devens. Massachusetts

Bioaccumulation Factor [a]	Bioconcentration Factor [a]
Analyte log K _{om} [b] Terrestrial Terrestrial Mammal [e] Bird [f] Aquatic [g] Aquatic Invertebrate Plant Compared to the c	Fish

[ai] USEPA (1990a) Basics of Pump-and-Treat Ground-Water Remediation Technology

[aj] Arthmetic mean BAF for corn, leaves, carrots, beets, sugarbeets, radishes, and soybeans (tops, roots, and whole plants) from USEPA (1985a) and Webber etal.

[ak] BAF calculated from discussion in Eisler (1986) stating that Aroclor 1254 residues in subcutaneous fat of adult minks were up to 38 times dietary levels. Converted to whole body concentrations assuming 10% lipid content.

[al] BAF calculated from data presented in Eisler, 1986. Kestrels fed 33 mg PCB/kg diet for 62-69 days accumulated 107 mg PCB/kg lipid weight in muscle Assuming muscle is 10% lipid content, the muscle concentration is about 10.7 mg/kg.

[am] Geometric mean of reported BAFs for earthworms (Edwards & Thompson, 1973). Values provided by Gish (1970) were converted from dry weight to wet weight by multiplying by a conversion factor of 0.2 assuming 80% water content.

[an] BAF calculated from data presented by Potter et al (1974). Based on an average dieldrin concentration in cow muscle and fat of 0.17 mg/kg (dry weight) and a dieldrin concentration of 0.11 mg/kg in the diet (dry weight).

[ao] Jeffries and Davis (1968).

[ap] USEPA (1992), Dermal Exposure Guidance.

[aq] BCFs for PAHs obtained from Eisler (1987).

[ar] Value for gamma-chlordane used as a surrogate.

[as] BAF calculated from data presented in Eisler, 1990. Rats fed 20 mg/kg diet technical chlordane (equivalent to 3.6 mg/kg diet cis – and trans – chlordane) for 350 days accumulated 20 mg/kg in lipids. Assuming 10% lipid content, the whole body concentration is about 2 mg/kg.

[at] BAF calculated from data presented in Eisler, 1990. Red—winged blackbirds fed 10 mg/kg diet technical chlordane (equivalent to 1.8 mg/kg diet cis— and trans— chlordane) for 84 days accumulated 1.8 mg/kg wet weight whole body residue.

[au] Geometric mean of reported BAFs for earthworms (Gish, 1970) converted from dry weight to wet weight assuming 80% water composition of earthworms.

NA = Not available

Table O-1.3 Summary of Oligochaete Bioaccumulation Factors and Summary of Crayfish and Fish Tissue Concentrations AOC 57

Remedial Investigation Report Devens, Massachusetts

		Sediment Data	Oligochaete Data	Oligochaete
Site ID	Analyte ¹	(μg/g dry weight)	(μg/g wet weight)	Bioaccumulation
		,		Factors 2
Control	4,4'-DDD	NA	ND	0.00E+00
	4,4'-DDE	NA	ND	0.00E+00
	4,4'-DDT	NA	ND	0.00E+00
	Aldrin ³	NA	0.0397	NA
	Aroclor - 1260	NA	ND	0.00E+00
	Dieldrin	NA	ND	0.00E+00
	% Lipids	NA	2.0	NA
57D-95-05X	4,4'-DDD	0.0258	ND	0.00E+00
	4,4'-DDE	ND	ND	0.00E+00
	4,4'-DDT	0.0363	ND	0.00E+00
	Aldrin ³	ND	ND	NA
	Aroclor-1260	0.301	ND	0.00E+00
	Dieldrin	0.0183	ND	0.00E+00
	% Lipids	NA	1.5	NA
57D-95-06X	4,4'-DDD	0.44	ND	0.00E+00
	4,4'-DDE	0.162	ND	0.00E+00
	4,4'-DDT	0.0759	ND	0.00E+00
	Aldrin ³	ND	0.0166	NA
	Aroclor - 1260	ND	ND	0.00E+00
	Dieldrin	ND	ND	0.00B+00
	% Lipids	, NA	1.3	NA
57D-95-08X	4,4'-DDD	0.49	ND	0.00E+00
	4,4'-DDE	0.18	ND	0.00E+00
	4,4'-DDT	0.12	ND	0.00E+00
	Aldrin ³	ND	0.0216	NA
	Aroclor-1260	ND	ND	0.00E+00
	Dieldrin	ND	ND	0.00E+00
	% Lipids	NA NA	0.5	NA

	Station 1 Crayfish	Station 2 Crayfish	Station 4 Crayfish	Station 6 Crayfish	Station 2 Suckers	Station 1 Pickerels
Analyte 4	(μg/g wet weight)	(μg/g wet weight)	(μg/g wet weight)	(μg/g wet weight)	(μg/g wet weight)	(μg/g wet weight)
% Lipids	1.0	1.1	0.6	1.4	1.8	1.8
4,4'-DDD	< 0.001	< 0.001	< 0.001	< 0.001	0.0809	0.0295
4,4'-DDE	< 0.001	< 0.001	0,00291	0.0126	0.0754	0.0313
Aroclor - 1260	0.263	< 0.02	< 0.02	< 0.02	0.0472	0.26
alpha - Chlordane	< 0.001	< 0.001	< 0.001	< 0.001	0.00523	< 0.001
gamma-Chlordane	< 0.001	< 0.001	< 0.001	< 0.001	0.00232	< 0.001
Dieldrin	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	0.00383
Heptachlor	< 0.001	< 0.001	0.00116	< 0.001	< 0.001	0.00224

Analyte ⁵	Average Crayfish Tissue Concentration (µg/g) for Muskrat, Mallard, and Raccoon Exposures ⁶	Average Fish Tissue Concentration (µg/g) for Great blue heron Exposures 6
4,4'-DDD	0	0.0552
4,4'-DDE	0.00413	0.0534
Aroclor - 1260	0.0733	0.154
Dieldrin	0	0.00217

NOTES:

¹ Only those analytes that were detected in oligochaete tissue are presented.

5 Only those analytes that were detected in sediments and retained as CPCs are presented.

NA = Not available, not applicable

ND = Not detected

² Units for BAFs are equal to mg/kg wet weight tissue over mg/kg dry weight sediment. All BAFs are assumed to be zero because none of the CPCs were detected in oligochaete tissue.

³ The tissue results for aldrin are listed; however, aldrin was not detected in any AOC 57 sediments and was not evaluated in the

AOC 57 ERA. Tissue concentrations of aldrin may be attributable to spike contamination in the analytical equipment at the laboratory.

 $^{^{4}}$ Only those analytes that were detected in crayfish or fish tissue are presented.

⁶ Average tissue concentrations use 1/2 the detection limit for non-detects, unless an analyte was not detected at all in which case a tissue concentration of zero was used.

Bioconcentration Data Table 0-1.4 AOC 57

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Chemical Name	Species	Age	Exposure	Concentration (µg/L)	BCF	In (BCF)	Reference	Year of Publ.
Inorganics								
Aluminum	Salvelinus fontinalis; Brook trout	0.2 grams, 30 days	56 days	268	36	3.583518938	AQUIRE, 1994	91
Aluminum chloride	Unio pictorum; Mussel;	9.4 (7.7–10.18) cm	3 weeks	166.8 to 414.3	250	120	AQUIRE, 1994	06
	Saimling although Ding reason plans	dN	to hours	1001	1461	- 500 - 500	= Geometric Mean Ber 101 Attuminum AOTHRF 1994	Muminum 1
Cadmium	Spirulling plateness, Diuc—green algae	dN dN	24 hours	100	183	2 906901059	AOTIRE 1994	8 &
	Spiruling platelists, Diuc – green algae Spiruling platensis: Blue – green algae	NN N	36 hours	2 2	18	2.890371757	AOUIRE, 1994	8 %
	Spirulina plateinsis, Diuc-green argae Spirulina platensis: Riue-green algae	an an	48 hours	100	16.1	2.778819272	AOUIRE, 1994	8 8
	Spiruling platensis; Blue—green algae	N. N.	12 hours	200	7.81	2.055404963	AQUIRE, 1994	9 8
	Spiruling platensis; Blue – green algae	NR	24 hours	200	8.77	2.171336806	AQUIRE, 1994	98
	Spirulina platensis; Blue-green algae	NR	36 hours	200	8.56	2.147100190	AQUIRE, 1994	98
	Spirulina platensis; Blue-green algae	NR	48 hours	200	7.42	2.004179057	AQUIRE, 1994	98
	Spirulina platensis; Blue-green algae	NR	12 hours	1000	6.22	1.827769906	AQUIRE, 1994	98
	Spirulina platensis; Blue-green algae	NR	24 hours	1000	7.04	1.951608170	AQUIRE, 1994	98
	Spirulina platensis; Blue-green algae	NR	36 hours	1000	7.14	1.965712776	AQUIRE, 1994	98
	Spirulina platensis; Blue-green algae	NR	48 hours	1000	6.77	1.912501086	AQUIRE, 1994	98
	Spirulina platensis; Blue-green algae	NR	12 hours	2000	3.06	1.118414916	AQUIRE, 1994	98
	Spirulina platensis; Blue-green algae	NR	24 hours	2000	2.79	1.026041595	AQUIRE, 1994	98
	Spirulina platensis; Blue-green algae	NR	36 hours	2000	2.63	0.966983846	AQUIRE, 1994	98
	Spirulina platensis; Blue-green algae	NR	48 hours	2000	2.1	0.741937344	AQUIRE, 1994	98
	Spirulina platensis; Blue-green algae	NR	12 hours	10000	2.42	0.883767540	AQUIRE, 1994	98
	Spirulina platensis; Blue-green algae	NR	24 hours	10000	1.85	0.615185639	AQUIRE, 1994	98
	Spirulina platensis; Blue-green algae	NR	36 hours	10000	1.69	0.524728528	AQUIRE, 1994	98
	Spirulina platensis; Blue-green algae	N.	48 hours	10000	1.55	0.438254930	AQUIRE, 1994	98
	Spirulina platensis; Blue-green algae	NR	12 hours	100	16.76	2.818995095	AQUIRE, 1994	98
	Spirulina platensis; Blue-green algae	NR	24 hours	100	14.02	2.640484881	AQUIRE, 1994	98
	Spirulina platensis; Blue - green algae	NR	36 hours	100	13.04	2.568021556	AQUIRE, 1994	98
	Spirulina platensis; Blue-green algae	NR	48 hours	100	13.41	2.596000697	AQUIRE, 1994	98
	Spirulina platensis; Blue-green algae	NR	12 hours	200	8.56	2.147100190	AQUIRE, 1994	98
	Spirulina platensis; Blue-green algae	NR	24 hours	200	7.64	2.033397603	AQUIRE, 1994	98
	Spirulina platensis; Blue-green algae	NR	36 hours	200	7.36	1.996059932	AQUIRE, 1994	98
	Spirulina platensis; Blue-green algae	NR	48 hours	200	6.5	1.871802176	AQUIRE, 1994	98
	Spirulina platensis; Blue-green algae	NR	12 hours	1000	6.13	1.813194749	AQUIRE, 1994	98
	Spirulina platensis; Blue-green algae	NR	24 hours	1000	9	1.791759469	AQUIRE, 1994	98
	Spirulina platensis; Blue-green algae	NR	36 hours	1000	6.16	1.818076777	AQUIRE, 1994	98
	Spirulina platensis; Blue-green algae	NR	48 hours	1000	4.13	1.418277407	AQUIRE, 1994	98
	Spirulina platensis; Blue-green algae	NR.	12 hours	2000	3.38	1.217875709	AQUIRE, 1994	98
٠	Spirulina platensis; Blue-green algae	NR	24 hours	2000	3.08	1.124929597	AQUIRE, 1994	98

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		Dever	Devens, Massachusetts	its				
Chominol Name		~			Ę		í	Year
Circuit da III d	operio	Age	caposuic	Concentration (µg/L)	P.C.	m(BCF)	Keierence	of Publ.
Cadmium (cont.)	Spirulina platensis; Blue-green algae	NR	36 hours	2000	3.03	1.108562619	AQUIRE, 1994	88
	Spirulina platensis; Blue-green algae	NR	48 hours	2000	2.63	0.966983846	AQUIRE, 1994	98
	Spirulina platensis; Blue-green algae	NR	12 hours	10000	2.63	0.966983846	AQUIRE, 1994	98
	Spirulina platensis; Blue-green algae	NR	24 hours	10000	2.31	0.837247524	AQUIRE, 1994	98
	Spirulina platensis; Blue-green algae	NR	36 hours	10000	2.21	0.792992515	AQUIRE, 1994	98
	Spirulina platensis; Blue-green algae	NR	48 hours	10000	2.2	0.788457360	AQUIRE, 1994	98
		וי	Average In(BCF	Average In(BCF) for Blue—green algae	algae =	1.67		
	Oncorhynchus mykiss; Rainbow trout	46.21 grams	72 days	0.00127	55	4.007333185	AQUIRE, 1994	68
	Coregonus clupeaformis; Lake whitefish	26.63 grams	72 days	0.00125	42.1	3.740047740	AQUIRE, 1994	68
	Cladoceran				320	5.768320995	USEPA, 1980	
	Crayfish				184	5.214935757	USEPA, 1980	
	Stoneffy				373	5.921578419	USEPA, 1980	
	Mayfly				1,630	7.396335293	USEPA, 1980	
	Mayfly				3,520	8.166216268	USEPA, 1980	
		4	Average In(BCF) for Mayfly =) for Mayfly =		7.78		
	Dragonfly				736	6.601230118	USEPA, 1980	
	Dragonfly				089	6.522092798	USEPA, 1980	
	Dragonfly				1,300	7.170119543	USEPA, 1980	
	Dragonfly				928	6.833031732	USEPA, 1980	
		₹	verage In(BCF	Average In(BCF) for Dragonfly =		6.78		
	Caddisfly				4,190	8.340456012	USEPA, 1980	
	Beetle				164	5.099866427	USEPA, 1980	
	Beetle				260	5.560681631	USEPA, 1980	
		¥	Average In(BCF) for Bettle) for Bettle =		5.33		
	Midge				2,220	7.705262474	USEPA, 1980	
	Midge				1,830	7.512071245	USEPA, 1980	
	Biting midge				936	6.841615476	USEPA, 1980	
	Biting midge				662	6.495265555	USEPA, 1980	
		4	Average In(BCF) for Midge =) for Midge =		7.14		
	Srail				1,750		USEPA, 1980	
						- 1	= Geometric Mean BCF for Cadmium	Cadmium
Copper	Spirulina platensis; Blue-green algae;	NN NR	12 hours	100	36.65	3.601413428	AQUIRE, 1994	9 8
	Spirulina platensis; Blue-green algae;	NR	24 hours	100	39.51	3.676553804	AQUIRE, 1994	98
	Spirulina platensis; Blue-green algae;	NR	36 hours	100	31.2	3.440418094	AQUIRE, 1994	98
	Spirulina platensis; Blue-green algae;	NR.	48 hours	100	25.38	3.233961462	AQUIRE, 1994	98
	Spirulina platensis; Blue-green algae;	NR	12 hours	200	12.5	2.525728644	AQUIRE, 1994	98
	Spirulina platensis; Blue-green algae;	NR	24 hours	200	17	2.833213344	AQUIRE, 1994	98
	Spirulina platensis; Blue-green algae;	NR	36 hours	200	12.7	2.541601993	AQUIRE, 1994	98
	Spirulira platensis; Blue – green algae;	NR	48 hours	200	11.4	2.433613355	AQUIRE, 1994	98



Bioconcentration Data AOC 57 Table 0-1.4

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								Year
	S	Ασρ	Exnosure	Concentration	BCF	In (BCF)	Reference	of
Chemical Iname	Species	P ·		(μg/L)		,		Publ.
	Chimilina nistensis: Blue - green aloge.	NR	12 hours	1000	8.13	2.095560923	AQUIRE, 1994	98
Copper (cont.)	Spirulia plateinis, bito greenages,	N. N.	24 hours	1000	12.2	2.501435951	AQUIRE, 1994	98
	Spiruliza platerisis, Diuc - giccaragae,	AN.	36 hours	1000	9.53	2.254444717	AQUIRE, 1994	98
	Spiriting platerists, Diver Erconnigue,	N. N.	48 hours	1000	8.13	2.095560923	AQUIRE, 1994	98
	Spirulita plateinsis, Diuc. giccutagae,	XX.	12 hours	2000	2.6	0.955511445	AQUIRE, 1994	98
	Spirulia platelisis, Diuc-Electraigue,	N. N.	24 hours	2000	4.99	1.607435909	AQUIRE, 1994	98
	Spirulina platensis, Diuc. green algae.	N N	36 hours	2000	4.27	1.451613827	AQUIRE, 1994	98
	Spirulina platensis: Blue—oreen algae:	N. N.	48 hours	2000	3.68	1.302912752	AQUIRE, 1994	98
	Spirulina platensis: Rine—oreen aloae:	NR	12 hours	10000	1.46	0.378436435	AQUIRE, 1994	98
	Spirming platensis, price green alone:	NR	24 hours	10000	3.4	1.223775431	AQUIRE, 1994	98
	Spirulina plateinsis, Diuc. Ercen urgue, Spirulina plateinsis. Rine—oreen aloae:	N. N.	36 hours	10000	3.07	1.121677561	AQUIRE, 1994	98
	Spirulia plateinis, Diuc Ercai agus, Caimlia alatensis Rhe—oreen aloae:	Y X	48 hours	10000	2.68	0.985816794	AQUIRE, 1994	98
	Spirulina plateinsis, Diuc Ercon argae; Spirulina plateinsis: Rine—oreen aloae:	N. N.	12 hours	100	28.31	3.343215099	AQUIRE, 1994	98
	Spiruling platerisis, Diuc. Ercon algae;	N N	24 hours	100	36.01	3.583796677	AQUIRE, 1994	98
	Spirulina platensis: Rine—oreen aloae:	NR	36 hours	100	35.39	3.566429294	AQUIRE, 1994	98
	Spirulina platensis: Rine—preen algae:	NR	48 hours	100	31.18	3.439776863		98
	Spirulina platensis: Rine—oreen algae:	N.	12 hours	200	9.37	2.237513096	AQUIRE, 1994	98
	Spirulina platensis: Rine—green algae:	NR	24 hours	200	11.02	2.399711803	AQUIRE, 1994	98
	Spirulina platensis: Rine-oreen algae:	NR	36 hours	200	12	2.484906649	AQUIRE, 1994	98
	Spirulina platensis: Blue—green algae:	NR	48 hours	200	11.47	2.439734931	AQUIRE, 1994	98
	Spirulina platensis: Blue-green algae:	NR	12 hours	1000	5.76	1.750937474	AQUIRE, 1994	98
	Spirulina platensis: Blue—green algae:	NR	24 hours	1000	6.22	1.827769906	AQUIRE, 1994	98
	Spirulina platensis: Rine—green algae:	NR	36 hours	1000	7.81	2.055404963	AQUIRE, 1994	98
	Spirulina platensis: Blue – green algae:	NR	48 hours	1000	8.58	2.149433913	AQUIRE, 1994	9 8
	Spirnling platensis: Blue-green algae;	NR	12 hours	2000	1.93	0.657520002	AQUIRE, 1994	98
	Spirulina platensis; Blue-green algae;	NR	24 hours	2000	2.12	0.751416088	AQUIRE, 1994	98
	Spirulina platensis; Blue-green algae;	NR	36 hours	2000	2.45	0.896088024	AQUIRE, 1994	%
	Spirulina platensis; Blue-green algae;	NR	48 hours	2000	2.41	0.879626747	AQUIRE, 1994	& Y
	Spirulina platensis: Blue—green algae;	NR	12 hours	10000	1.2	0.182321556	AQUIRE, 1994	9
	Spirulina platensis; Blue-green algae;	NR	24 hours	10000	1.35	0.300104592	AQUIRE, 1994	9 8
	Spiruling platensis: Blue-green algae;	NR	36 hours	10000	1.49	0.39877612	AQUIRE, 1994	9
	Spirulina platensis: Blue-green algae;	NR	48 hours	10000	1.38	0.322083499	AQUIRE, 1994	98
			Average In(BC	Average In(BCF) for Blue-green algae =	n algae =	1.95		
	Asiatic clam				19,800	9.893437216	USEPA, 1985a	
	Cladoren				471	6.154858094	USEPA, 1985a	
	Stoneffy				203	5.313205979	USEPA, 1985a	
	- Training					4.0040	= Geometric Mean BCF for Copper	
I ead	Salvelinus fontinalis; Brook trout	FINGERLING, 7.3-10c	3 weeks	4.1 to 88	1,400	7.244227515	AQUIRE , 1994	27
	Salvelinus fontinalis; Brook trout	FINGERLING, 7.3-10 c	3 weeks	135	41.9	3.735285826	AQUIRE, 1994	ZT

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		Deven	Devens, Massachusetts	tts				
		-						Year
Chemical Name	Species	Age	Exposure	Concentration (us/L)	BCF	In (BCF)	Reference	of Publ
Lead (cont.)	Salvelinus fontinalis; Brook trout	FINGERLING, 7.3-10c	3 weeks	135	7.78	2.051556338	AQUIRE, 1994	75
`	Salvelinus fontinalis; Brook trout	FINGERLING, 7-10 cm	3 weeks	4.3	160	5.075173815	AQUIRE, 1994	75
	Salvelinus fontinalis; Brook trout	FINGERLING, 7-10 cm	3 weeks	5.7	140	4.941642422	AQUIRE, 1994	75
	Salvelinus fontinalis; Brook trout	FINGERLING, 7-10 cm	3 weeks	12.5	73	4.290459441	AQUIRE, 1994	75
	Salvelinus fontinalis; Brook trout	FINGERLING, 7-10 cm	3 weeks	12.5	32	3.465735902	AQUIRE, 1994	75
	Salvelinus fontinalis; Brook trout	FINGERLING, 7-10 cm	3 weeks	12.5	22	3.178053830	AQUIRE, 1994	75
	Salvelinus fontinalis; Brook trout	FINGERLING, 7-10 cm	3 weeks	12.5	48	3.871201010	AQUIRE, 1994	75
	Salvelinus fontinalis; Brook trout	FINGERLING, 7-10 cm	3 weeks	12.5	160	5.075173815	AQUIRE, 1994	75
:	Salvelinus fontinalis; Brook trout	FINGERLING, 7-10 cm	3 weeks	12.5	16	2.772588722	AQUIRE, 1994	75
		V	verage In(BC	Average In(BCF) for Brook trout	t =	4.15		
	Colisa fasciata; Giant gourami	NR	8 hours	305	2.9	1.064710737	AQUIRE, 1994	16
	Colisa fasciata; Giant gourami	NR	8 hours	206	0.8	-0.22314355	AQUIRE, 1994	16
	Colisa fasciata; Giant gourami	NR	16 hours	0.860	3.4	1.223775431	AQUIRE, 1994	91
	Colisa fasciata; Giant gourami	NR	16 hours	0.860	0.4	-0.91629073	AQUIRE, 1994	91
	Colisa fasciata; Giant gourami	NR	16 hours	0.860	1	0	AQUIRE, 1994	91
	Colisa fasciata; Giant gourami	NR	24 hours	801	3.4	1.223775431	AQUIRE, 1994	16
	Colisa fasciata; Giant gourami	NR	24 hours	801	0.3	-1.20397280	AQUIRE, 1994	91
	Colisa fasciata; Giant gourami	NR	24 hours	801	1.1	0.095310179	AQUIRE, 1994	91
	Colisa fasciata; Giant gourami	NR	5 days	1000	S	1.609437912	AQUIRE, 1994	91
	Colisa fasciata; Giant gourami	NR	5 days	1000	0.5	-0.69314718	AQUIRE, 1994	91
	Colisa fasciata; Giant gourami	NR	5 days	1000	3.9	1.360976553	AQUIRE, 1994	91
	Colisa fasciata; Giant gourami	NR	10 days	701	6.9	1.931521411	AQUIRE, 1994	91
	Colisa fasciata; Giant gourami	NR	10 days	701	0.7	-0.35667494	AQUIRE, 1994	91
	Colisa fasciata; Giant gourami	NR	10 days	701	6.1	1.808288771	AQUIRE, 1994	91
	Colisa fasciata; Giant gourami	NR	15 days	286	5.3	1.667706820	AQUIRE, 1994	91
	Colisa fasciata; Giant gourami	NR	15 days	286	0.8	-0.22314355	AQUIRE, 1994	91
	Colisa fasciata; Giant gourami	NR	15 days	286	5.7	1.740466174	AQUIRE, 1994	91
	Colisa fasciata; Giant gourami	NR	20 days	621	7.2	1.974081026	AQUIRE, 1994	91
	Colisa fasciata; Giant gourami	NR	20 days	621	0.7	-0.35667494	AQUIRE, 1994	91
	Colisa fasciata; Giant gourami	NR	20 days	621	6.5	1.871802176	AQUIRE, 1994	91
	Colisa fasciata; Giant gourami	NR	25 days	601	∞	2.079441541	AQUIRE, 1994	91
	Colisa fasciata; Giant gourami	NR	25 days	109	6.0	-0.10536051	AQUIRE, 1994	91
	Colisa fasciata; Giant gourami	NR	25 days	109	7.1	1.960094784	AQUIRE, 1994	91
	Colisa fasciata; Giant gourami	NR	8 hours	1799	6.0	-0.10536051	AQUIRE, 1994	91
	Colisa fasciata; Giant gourami	NR	8 hours	1799	9.0	-0.51082562	AQUIRE, 1994	91
	Colisa fasciata; Giant gourami	NR	8 hours	1799	0.8	-0.22314355	AQUIRE, 1994	16
,	Colisa fasciata; Giant gourami	NR	16 hours	1602	1.8	0.587786664	AQUIRE, 1994	91
	Colisa fasciata; Giant gourami	NR	16 hours	1602	0.8	-0.22314355	AQUIRE, 1994	91
	Colisa fasciata; Giant gourami	N. N.	16 hours	1602	1.8	0.587786664	AQUIRE, 1994	91



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Chemical Name	Species	Age	Exposure	Concentration	BCF	ln (BCF)	Reference	jo
				(μg/L)				Publ.
Lead (cont.)	Colisa fasciata; Giant gourami	NR	24 hours	1523	1.7	0.530628251	AQUIRE, 1994	91
•	Colisa fasciata; Giant gourami	NR	24 hours	1523	0.8	-0.22314355	AQUIRE, 1994	91
	Colisa fasciata; Giant gourami	NR	24 hours	1523	2.1	0.741937344	AQUIRE, 1994	91
	Colisa fasciata; Giant gourami	NR	5 days	1544	3.1	1.131402111	AQUIRE, 1994	91
	Colisa fasciata; Giant gourami	NR	5 days	1544	1.2	0.182321556	AQUIRE, 1994	91
	Colisa fasciata; Giant gourami	NR	5 days	1544	3.2	1.163150809	AQUIRE, 1994	91
	Colisa fasciata; Giant gourami	NR	10 days	1368	2.8	1.029619417	AQUIRE, 1994	91
	Colisa fasciata; Giant gourami	NR	10 days	1368	2.1	0.741937344	AQUIRE, 1994	91
	Colisa fasciata; Giant gourami	NR	10 days	1368	4.2	1.435084525	AQUIRE, 1994	91
	Colisa fasciata; Giant gourami	NR	15 days	1402	4.5	1.504077396	AQUIRE, 1994	91
	Colisa fasciata; Giant gourami	NR	15 days	1402	1.5	0.405465108	AQUIRE, 1994	91
	Colisa fasciata; Giant gourami	NR	15 days	1402	3.7	1.308332819	AQUIRE, 1994	91
	Colisa fasciata; Giant gourami	NR	20 days	1301	6.8	1.916922612	AQUIRE, 1994	91
	Colisa fasciata; Giant gourami	NR	20 days	1301	1.9	0.641853886	AQUIRE, 1994	91
	Colisa fasciata; Giant gourami	NR	20 days	1301	4.9	1.589235205	AQUIRE, 1994	91
	Colisa fasciata; Giant gourami	NR	25 days	1300	4.9	1.589235205	AQUIRE, 1994	91
	Colisa fasciata; Giant gourami	NR	25 days	1300	1.8	0.587786664	AQUIRE, 1994	16
	Colisa fasciata; Giant gourami	NR	25 days	1300	5	1.609437912	AQUIRE, 1994	91
	Colisa fasciata; Giant gourami	NR	8 hours	4324	0.8	-0.22314355	AQUIRE, 1994	91
	Colisa fasciata; Giant gourami	NR	8 hours	4324	0.4	-0.91629073	AQUIRE, 1994	91
	Colisa fasciata; Giant gourami	NR	8 hours	4324	1	0	AQUIRE, 1994	91
	Colisa fasciata; Giant gourami	NR	16 hours	4300	1.7	0.530628251	AQUIRE, 1994	91
	Colisa fasciata; Giant gourami	NR	16 hours	4300	9.0	-0.51082562	AQUIRE, 1994	91
	Colisa fasciata; Giant gourami	NR	16 hours	4300	1	0	AQUIRE, 1994	91
	Colisa fasciata; Giant gourami	NR	24 hours	4285	1.4	0.336472236	AQUIRE, 1994	91
	Colisa fasciata; Giant gourami	NR	24 hours	4285	0.5	-0.69314718	AQUIRE, 1994	91
	Colisa fasciata; Giant gourami	NR	24 hours	4285	1.6	0.470003629	AQUIRE, 1994	91
	Colisa fasciata; Giant gourami	NR	5 days	4188	4.2	1.435084525	AQUIRE, 1994	91
	Colisa fasciata; Giant gourami	NR	5 days	4188	6.0	-0.10536051	AQUIRE, 1994	91
	Colisa fasciata; Giant gourami	NR	5 days	4188	2.2	0.788457360	AQUIRE, 1994	91
	Colisa fasciata; Giant gourami	NR	10 days	4180	4.2	1.435084525		91
	Colisa fasciata; Giant gourami	NR	10 days	4180		0	AQUIRE, 1994	91
	Colisa fasciata; Giant gourami	NR	10 days	4180	3.8	1.335001066	AQUIRE, 1994	91
	Colisa fasciata; Giant gourami	NR	15 days	4060	4.5	1.504077396	AQUIRE, 1994	91
	Colisa fasciata; Giant gourami	NR	15 days	4060	1.1	0.095310179		91
	Colisa fasciata; Giant gourami	NR	15 days	4060	3.9	1.360976553	AQUIRE, 1994	91
	Colisa fasciata; Giant gourami	NR	20 days	4000	4.9	1.589235205	AQUIRE, 1994	91
	Colisa fasciata; Giant gourami	NR	20 days	4000	1.4	0.336472236	AQUIRE, 1994	91
·	Colisa fasciata; Giant gourami	NR	20 days	4000	4.4	1.481604540	AQUIRE, 1994	91

Table O-1.4 Bioconcentration Data AOC 57

		Deven	Devens, Massachusetts	ts				
								Year
Chemical Name	Species	Age	Exposure	Concentration (ug/L)	BCF	In (BCF)	Reference	of Publ.
Lead (cont.)	Colisa fasciata; Giant gourami	NR	25 days	4000	4.5	1.504077396	AQUIRE, 1994	
•	Colisa fasciata; Giant gourami	NR	25 days	4000	1.4	0.336472236	AQUIRE, 1994	91
	Colisa fasciata; Giant gourami	NR	25 days	4000	4.3	1.458615022	AQUIRE, 1994	91
		Y	verage In(BCF	Average In(BCF) for Giant gourami	H	0.69		
	Snail				1,700	7.43838353	USEPA, 1985b	
	Snail				738	6.603943824	USEPA, 1985b	
		¥	Average In(BCF) for Snail =) for Snail =		7.02		
	Stonefly				1,120	7.021083964	USEPA, 1985b	
	Caddisfly				499	6.212606095	USEPA, 1985b	
						-11	Geometric Mean BCF for Lead	or Lead
Manganese	Physa sp; Pouch snail;	NR	NR	165.1	1,300	7.170119543	AQUIRE, 1994	77
	Physa sp; Pouch snail;	NR	NR	142.9	800	6.684611727	AQUIRE, 1994	77
		Y	Average In(BCF) for Snail) for Snail =		6.93		
	Corbicula fluminea; Asiatic clam	NR	NR	99	470	6.152732694	AQUIRE, 1994	80
	Corbicula fluminea; Asiatic clam	NR	NR	99	1,800	7.495541943	AQUIRE, 1994	80
	Corbicula fluminea; Asiatic clam	NR	NR	70	470	6.152732694	AQUIRE, 1994	80
	Corbicula fluminea; Asiatic clam	NR	NR	20	2,100	7.649692623	AQUIRE, 1994	80
		A	verage In(BCF	Average In(BCF) for Asiatic clam	II	98.9		
	Plankton; Plankton;	NR	NR	32	069	6.536691597	AQUIRE, 1994	78
	Oligochaeta; Annelid worm class	NR	NR	32	88	4.477336814	AQUIRE, 1994	78
	Insecta; Insect class;	NR	NR	32	28	3.332204510	AQUIRE, 1994	78
	Osteichthyes; Class - bony fishes	661-824 grams	NR	32	8	4.430816798	AQUIRE, 1994	78
	Lemna minor; Duckweed;	NR	NR R	148.5	10,900	9.296518068	AQUIRE, 1994	75
	Lemna sp; Duckweed;	NR	NR	16.66 to 23.23	46,647	10.75036389	AQUIRE, 1994	80
		. "	Average In(BCF	In(BCF) for Duckweed =		10.02		
	Chironomidae; Midge family;	LARVAE	NR	< 30	3,900	8.268731832	AQUIRE, 1994	82
	Crustacea; Crustacean class;	NR	NR	< 30	1,100	7.003065458	AQUIRE, 1994	83
	Unio pictorum; Mussel;	12.5 grams	NR NR	< 30	160,000	11.98292909	AQUIRE, 1994	83
	Anodonta cygnea; Swan mussel;	28.5 grams	NR	< 30	350,000	12.76568843	AQUIRE, 1994	82
		۱.	Average In(BCF) for Mussel =	for Mussel =		12.37		
	Abramis brama; Bream;	350 grams	NR	< 30	009	6.396929655	AQUIRE, 1994	82
	Abramis brama; Bream;	350 grams	NR	× 30	240	5.480638923	AQUIRE, 1994	82
	Abramis brama; Bream;		NR	< 30	170	5.135798437	AQUIRE, 1994	82
		٠,	Average In(BCF) for Bream =) for Bream =		2.67		
	Stzostedion lucioperca; Pikeperch	500 grams	NR	< 30	260	5.560681631	AQUIRE, 1994	82
	Stizostedion lucioperca; Pikeperch	500 grams	NR	< 30	210	5.347107530	AQUIRE, 1994	82
	Stizostedion lucioperca; Pikeperch	500 grams	NR	< 30	70	4.248495242	AQUIRE, 1994	82
		۱.	Average In(BCF)	for Pikeperch =		5.05		
	Melosira varians; Diatom;	NR	NR	16.66 to 23.23	59,052	10.98617369	AQUIRE, 1994	80



Table O-1.4 Bioconcentration Data AOC 57

Remedial Investigation Report

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		Deve	Devells, massachusetts	611				
								Year
Chemical Name	Species	Age	Exposure	Concentration	BCF	ln (BCF)	Reference	oę
Chemical Ivanie		þ	•	(µg/L)				Publ.
Mananese (cont.)	Flodes sp: Waterweed:	NR	NR	16.66 to 23.23	12,465	9.430679996	AQUIRE, 1994	80
(carried County)	Planaria sn: Planarian, flatworm	NR	NR	16.66 to 23.23	2,255	7.720905251	AQUIRE, 1994	8
	Tubifex so: Tubificid worm:	NR	NR	16.66 to 23.23	14,583	9.587611745	AQUIRE, 1994	80
						1,665 ==	1,665 = Geometric Mean BCF for Manganese	. Manganese
Zinc	Asiatic clam				126.2	4.837867950	USEPA, 1987	
	Asiatic clam				71.6	4.271095074	USEPA, 1987	
	Asiatic clam				102.2	4.626931677	USEPA, 1987	
			Average In(BC	Average In(BCF) for Asiatic clams =	II SI	4.58		
	Maufly				1,130	7.029972911	USEPA, 1987	
	Stonefly				106	4.663439094	USEPA, 1987	
	- Control					227 =	227 = Geometric Mean BCF for Zinc	Zinc

NOTES:

NR = Not Reported cm = centimeters

Table O-1.5 Ingestion Toxicity Information for Wildlife AOC 57

Cari Liber Car					Devens, Massachusetts			
Market AMANY VIEW Mark	Chemical	Test Species	Test Type	Duration	Effect	Lethal RTV mg/kgBW-day Oral LD _{v0} LOAEL	Sublethal RTV mg/kgBW-day LOAEL NOAEL	Reference
Micros	INORGANIC ANALYTES							
First	Auminum	Mouse	Oral (chronic)	2-3 genrtus	Reduced body weight gain of newborns		425	NIOSH, 1985
Fig. 10 Fig.		Rat	Oral (subchronic)	15 days	Reduced growth		100	Bernuzzi, et al., 1989
Rest		Rat	Oral LD ₅₀	NR	Mortality			Sax, 1984
Ref. Cont.	Antimony	Rat	Oral (acute)	Single oral dose	NOAEL for death	16,714		ATSDR, 1991a
March Marc		Rat	Oral (chronic)	SN :	Long evity; blood glucose; cholesterol		0.35 (water)	IRIS, 1993
No. 10		Kat	Oral (subchrome)	24 weeks	Decreased RBC, swelling of hepatic cords		41.8	AISDR, 1991a
Mailacet	Arsent	Kat	Oraș	N.	Reproductive effects		0.01	KIECS, 1993
Marie		Kat	Oral	NK !	Keproductive effects		0.36	KIECS, 1993
Market		Rat	Oral LD ₅₀	¥.	Mortality	763		RTECS, 1993
Note		Mouse	Oral LD ₅₀	ž, į	Mortality	145		KIECS, 1993
Processed Controlled 1 style 1		Mallard	Oral LD ₅₀	XX :	Mortality			Eisler, 1988
Ref. Consequence Consequ		Cowbird	Oral LD ₅₀	11 days	Mortality			Eisler, 1988
Day Day Contact		Young chicken	Oral	56 days	Egg production			Hermeyer et. al., 1977
Ratio		Dog	Oral (chronic)	2 years	Mortality	3.1		ATSDR, 1991b
Rati	Barium	Rat	Oral (chronic)	68 weeks	Renal ultrastructure changes		142	IRIS, 1993
Right Charles Di chays Diversard continue weight Elst Charles Di chays Diversard continue weight Elst Charles Di chays Diversard continue weight Elst Charles Di chays Diversard continue weight Elst Charles Di ch		Rat	Oral (subchronic)	13 weeks	Renal effects	•	91	Dietz et al., 1992
Ref. COLI (Liberbane) 13 works 19 wo		Rat	Oral (acute)	10 days	Decreased ovarian weight		198	ATSDR, 1991b
m Rat Oral Liboga NR Metality Cold Liboga NR Increase in lung autocomas Cold Cold Cold Cold Cold Cold Cold Cold		Rat	Oral (subchronic)	13 weeks	20% population mortality	430		Dietz et al., 1992
Right	Bervllium	Rat	Oral LDss	N.	Mortality	10		USEPA, 1985g
m Rat Oral (obreza) N.3 years Reprintative effects 155 n Rat Oral N.B. Reproductive effects 220 225 Rat Oral Do N.B. Reproductive effects 220 23 Rat Oral Do N.B. Reproductive effects 220 23 Mouse Oral Do N.B. Accrafing 80 448 Mouse Oral Do N.B. Accrafing 80 448 Mouse Oral Do N.B. Accrafing 80 448 Mouse Oral Do N.B. Accrafing 80 448 Mouse Oral Libo N.B. Accrafing 80 448 Mouse Oral Libo N.B. Accrafing 80 448 Mouse Oral (washound) 90 days Reproductive effects 200 448 Rat Oral (washound) 90 days Reproductive effects 200 448 Rat Oral (w	•	Rat	Oral (chronic)	NR	Increase in lung sarcomas		0.22	USEPA, 1985g
Rate Ocal NR Reproductive effects 225		Rat	Oral (chronic)	3,2 years	Respiratory, cardiopulmonary, hematological, and hepatic effects		0.85	ATSDR, 1991d
Right Ordina NR Reproductive effect 220 221	Cadminm	Rat	Oral	N.	Reproductive effects		155	RTECS, 1993
Rat		Rat	Oral	N.	Reproductive effects		220	RTECS, 1993
Rat		Rat	Oral	X.	Remoductive effects		21.5	RTECS, 1993
Rati		Rat) C	Z.	Remoductive effects		33	RTECS, 1993
Note		Rat	Oral LD.		Mortality	250		Eisler, 1985
Monte Oral Db2 NR Mortability NR Repolations 600 448 Moure Oral Db2 NR Reproductive effects 1.700 1.700 1.700 Guines pig Oral Db2 NR Reproductive effects 1.50 1.700 1.700 Mahare Oral Db2 NR Mortability of pertual spread 1.20 1.400 1.700 Rat Oral (infections) 7 weeks Heigh prematagenesis 1.20 1.400 Rat Oral (infections) 7 weeks Heigh prematagenesis 1.400 1.400 Rat Oral (infections) 7 weeks Heigh prematagenesis 1.400 1.400 Rat Oral (infections) 6 weeks Height-freed hyperensis 1.100 1.100 Rat Oral (infections) 6 weeks Testivitat degeneration 1.100 1.100 Rat Oral (infections) 6 weeks Decreased late is blood call count 2.00 1.100 Rat Oral (infections) 1 weeks NR		Rat	Oral I.D.	N.	Mortality	225		RTECS, 1993
Montes Opinions Opinions Opinions Opinions Opinions Opinions Opinions Opinions Opinions NR Reproductive effects PR Reproductive effects PR PR Reproductive effects PR		Monse	Oral LD.	W.	Mortality	890		RTECS, 1993
Monte Continue C		Mouse	Oral	NR	Reproductive effects		448	RTECS, 1993
Conince pig		Mosise	Oral	N.	Reproductive effects		1.700	RTECS, 1993
wm Malland ** Oral (onlibronis) 90 days Egg production suppressed 10 Rath Oral (onlibronis) 7 days Michally 7 medes Decreased permanagenesis 1400 Rath Oral (orlectonis) 7 medes Decreased permanagenesis 126 120 Rath Oral (orlectonis) 7 medes Decreased operation 97 1400 Rat Oral (orlectonis) 8 medes Herpichicanal apprenain 91 120 Rat Oral (orlectonis) 8 days Testicitude degeneration 93 123 Rat Oral (orlectonis) 95 days Testicitude degeneration 94 123 Rat Oral (orlectonis) 96 days Testicitude degeneration 94 120 Rat Oral (orlectonis) 90 days Testicitude degeneration 94 1140 Rat Oral (orlectonis) 90 days Testicitude degeneration 94 1140 Rat Oral (orlectonis) 10 days Decreased fred blood cell count 94 1140<		Grimea nio	Oral I.D.	Z.	Mortality	150	!	Fisler. 1985
Apparate Crail D _{D₀} Stay Metality		Mallard	Oral (subchronic)	90 days	Bog production suppressed		10	Eisler, 1985
Note	Chromium	Japanese quail	Oral LD.	5 days	Mortality	126		Hill and Camardese, 1986
Montee Oral (stakenaik) 7 weeks Decreased spermatogenesis 3.5 Rat Oral (stakenaik) 5 months Reproductive effects 200 Rat Oral LD ₂₀ Mortality Mortality 7.0 Rat Oral (chronic) 9.6 days Testivatur degenerate look weight gain 20 Rat Oral (chronic) 9.6 days Testivatur degenerate look weight gain 20 Rat Oral (chronic) 9.6 days Testivatur degenerate look weight gain 20 Rat Oral (chronic) 9.6 days Testivatur degenerate look weight gain 20 Rat Oral (chronic) 9.6 days Testivatur degenerate look weight gain 20 Rat Oral (chronic) 9.6 days Testivatur degenerate level weight gain 11 Rat Oral (chronic) 9.0 days Decreased liter sizes with testless nice effects 11 Rat Oral (chronic) 9.0 days Reproductive effects 70 Rat Oral (chronic) 9.0 days Reproductive effects 11,100 Rat		Rat	Oral (subchronic)	90 days	Histopathologic and reproductive effects		1,400	Ivankovic and Preusman, 1975
Back Doach		Mouse	Oral (chronic)	7 weeks	Decreased spermatogenesis			ATSDR, 1993a
Rat Oral LD ₂₀ Mortality Mortality 200 Rat Grad LD ₂₀ Mortality 13 200 Rat Coral (stubchronic) 36 weeks Decreased by weight gain 13 Rat Coral (stubchronic) 36 days Testivulate degeneration 13 Rat Coral (stubchronic) 4 weeks Testivulate atrophy 20 Rat Coral (stubchronic) 4 weeks Testivulate atrophy 20 Rat Coral (stubchronic) 30 days Decreased tree blood cell count 130 Rat Oral LD ₂₀ NR Mortality 1,140 1,140 Rat Oral (stubchronic) 12 - 14 days Decreased tree lifests 1,100 Rat Oral LD ₂₀ NR Reproductive effects 220 1,100 Rat Oral LD ₂₀ NR Reproductive effects 220 1,100 Rat Oral LD ₂₀ NR Reproductive effects 220 1,100 Rat Oral LD ₂₀ NR Reproduct		Black Duck	Oral (subchronic)	5 months	Reproductive effects	,	200	Outridge and Scheuhammer, 1993
Rat Coral LD_0 Mortality Mortality 91 Rat Single coral dose Heaptiviteenal hyperennia 13 Rat Oral (subchronic) 95 days Testicular degeneration 13 Rat Oral (subchronic) 95 days Testicular degeneration 13 Dog Oral (subchronic) 96 days Testicular degeneration 13 Rat Oral (subchronic) 97 days Decreased level blood cell count 5 Rat Oral (subchronic) 30 days Decreased level sold cell count 1120 Rat Oral LD ₂₀ NR Reproductive effects 1140 Rat Oral NR Reproductive effects 1140 Rat Oral LD ₂₀ NR Reproductive effects 1140 Rat Oral LD ₂₀ NR Reproductive effects 220 23 Advise Oral culcivitive effects 1140 1140 1140 1140 Rat Oral culcivitive effects Oral culcivitive effects 12-14 days Reprod		Rat	Oral LDen		Mortality	200		ATSDR, 1991c
Rat Single oral dose Hepatrkrenal hyperennia Rat Oral (chronic) 36 weeks Decreased body weight gain 42 Rat Oral (chronic) 36 days Testicular strophy 13 Dog Oral (chronic) 60 days Testicular strophy 20 Rat Oral (chronic) 30 days Testicular strophy 20 Rat Oral (chronic) 30 days Decreased liter sizes with teratogenic effects 132 Rat Oral (chronic) 30 days Decreased liter sizes with teratogenic effects 790 Rat Oral (chronic) 30 days Decreased liters 790 790 Rat Oral (chronic) 30 days Decreased liters 720 730 Rat Oral NR Reproductive effects 720 1,140 Rat Oral (subchronic) 12-14 days Decreased feel body weight 220 1,120 Mouse Oral NR Reproductive effects 220 230 Mouse Oral NR	Cohalt	Rat	Oral LD.		Mortality	16		ATSDR, 1991d
Rat Oral (subchronic) 8 weeks Decreased body weight gain 4.2 Rat Oral (chronic) 98 days Testicular degeneration 13 Rat Oral (chronic) 98 days Testicular stepph 20 Dog Oral (subchronic) 4 weeks Increased red blood cell count 5 Rat Oral (nubchronic) 30 days Decreased liter sizes with tentogenic effects 1140 Rat Oral LD ₅₀ NR Reproductive effects 790 1140 Rat Oral NR Reproductive effects 720 1140 Rat Oral LD ₅₀ NR Reproductive effects 220 1100 Rat Oral LD ₅₀ NR Reproductive effects 220 1.100 Mouse Oral chronic) 12 - 14 days Reproductive effects 220 230 Mouse Oral NR Reproductive effects 220 230 Mouse Oral LD ₅₀ NR Reproductive effects 220 230 Mous		Rat	Single oral dose		Henatic/renal hyperemia			ATSDR. 1991d
Rat Oral (chronic) 96 days Testicular degeneration 13 Dog Oral (chronic) 69 days Testicular at rophy 20 Rat Single oral dose Reproductive effects 152 Rat Oral LD ₂₀ NR Mortality 790 Mouse Oral (chronic) 30 days Decreased litter sizes with teratogenic effects 790 Rat Oral LD ₂₀ NR Reproductive effects 790 Rat Oral NR Reproductive effects 1,140 Rat Oral NR Reproductive effects 230 Rat Oral LD ₂₀ NR Reproductive effects 1,100 Mouse Oral LD ₂₀ NR Reproductive effects 230 Mouse Oral NR Reproductive effects 4,800 Mouse Oral NR Reproductive effects 4,800 Mouse Oral NR Reproductive effects 4,800 Mouse Oral NR Reproductive effects <td></td> <td>Rat</td> <td>Oral (subchronic)</td> <td>8 weeks</td> <td>Decreased body weight gain</td> <td></td> <td>4.2</td> <td>ATSDR, 1991d</td>		Rat	Oral (subchronic)	8 weeks	Decreased body weight gain		4.2	ATSDR, 1991d
Rat Oral (chronic) 69 days Testicular atrophy 20 Dog Oral (subchronic) 4 weeks Increased red blood cell count 5 Rat Oral (chronic) 30 days Decreased lifter sizes with teratogenic effects 152 Rat Oral NR Reproductive effects 790 Rat Oral NR Reproductive effects 730 Rat Oral NR Reproductive effects 1,140 Rat Oral LDs, NR Reproductive effects 220 Calf Oral LDs, NR Reproductive effects 220 Mouse Oral (subchronic) 12-14 days Decreased feal body weight 1,170 Mouse Oral NR Reproductive effects 220 Mouse Oral NR Reproductive effects 4,800 Mouse Oral NR Reproductive effects 4,800 Donestic animal Oral NR Reproductive effects 4,800 Mouse Oral <	-	Rat	Oral (chronic)	98 davs	Testicular degeneration	,	13	ATSDR, 1991d
Dog Oral (subchronic) 4 weeks Increased red blood cell count 5 Rat Single oral dose Reproductive effects 152 Mouse Oral (chronic) 30 days Decreased lifet sizes with teratogenic effects 100 Rat Oral (chronic) 30 days Decreased lifet sizes with teratogenic effects 730 Rat Oral NR Reproductive effects 730 Rat Oral NR Reproductive effects 220 Rat Oral subchronic) 12-14 days Decreased feels body weight 220 Mouse Oral subchronic) 12-14 days Decreased feels body weight 2.5 Mouse Oral NR Reproductive effects 2.5 Mouse Oral NR Reproductive effects 6,300 Mouse Oral NR Reproductive effects 6,300 Mouse Oral NR Reproductive effects 6,300 Mouse Oral NR Reproductive effects 6,300 Mouse		Rat	Oral (chronic)	69 days	Testicular atrophy		20	ATSDR, 1991d
Rat Single oral dose Reproductive effects 152 Rat Oral (chronic) 30 days Decreased litter sizes with teratogenic effects 790 Rat Oral (chronic) 30 days Decreased litter sizes with teratogenic effects 790 Rat Oral NR Reproductive effects 730 Rat Oral LD ₅₀ NR Reproductive effects 220 Rat Oral LD ₅₀ NR Reproductive effects 220 Monse Oral (subchronic) NR Reproductive effects 220 Monse Oral NR Reproductive effects 220 Monse Oral NR Reproductive effects 220 Monse Oral NR Reproductive effects 4,800 Monse Oral NR Reproductive effects 4,800 Monse Oral NR Reproductive effects 4,800 Monse Oral NR Reproductive effects 4,800 Monse Oral NR	_	Dog	Oral (subchronic)	4 weeks	Increased red blood cell count		5	ATSDR, 1991d
Rat Oral LD ₂₀ NR Mortality Created liter sizes with texatogenic effects 940 100 Rat Oral (chronic) 30 days Decreased liter sizes with texatogenic effects 790 Rat Oral NR Reproductive effects 790 Rat Oral NR Reproductive effects 1,140 Calf Oral LD ₂₀ NR Reproductive effects 220 Mouse Oral (subchronic) 12-14 days Decreased fetal body weight 220 Mouse Oral NR Reproductive effects 6,300 Mouse Oral NR Reproductive effects 6,300 Mouse Oral NR Reproductive effects 6,300 Mouse Oral NR Reproductive effects 4,800 Mouse Oral NR Reproductive effects 662 Mouse Oral NR Reproductive effects 662 Mouse Oral NR Reproductive effects 662 Mouse <td>Copper</td> <td>Rat</td> <td>Single oral dose</td> <td></td> <td>Reproductive effects</td> <td></td> <td>152</td> <td>NIOSH, 1985</td>	Copper	Rat	Single oral dose		Reproductive effects		152	NIOSH, 1985
Rat Oral LD _{SO} NR Mortality 100 Rat Oral (chronic) 30 days Decreased litter sixes with teratogeure effects 790 Rat Oral NR Reproductive effects 790 Rat Oral NR Reproductive effects 1,140 Rat Oral NR Reproductive effects 220 Calf Oral LD _{SO} NR Reproductive effects 1,100 Mouse Oral (subchronic) 12-14 days Decreased fetal body weight 1,120 Mouse Oral NR Reproductive effects 6,300 Mouse Oral NR Reproductive effects 6,300 Mouse Oral NR Reproductive effects 4,800 Domestic animal Oral NR Reproductive effects 4,800 Mammal Oral NR Reproductive effects 2,118 Mammal Oral NR Reproductive effects Mammal Oral NR Reproductive effects			;	!				and RTECS, 1993
Mouse Oral (chiconx) 90 days Decreased intersises with transgence effects 100 Rat Oral NR Reproductive effects 790 Rat Oral NR Reproductive effects 1,140 Rat Oral NR Reproductive effects 220 Rat Oral (cubchronic) 12-14 days Decreased feel body weight 220 Mouse Oral NR Reproductive effects 2.2 Mouse Oral NR Reproductive effects 6,300 Mouse Oral NR Reproductive effects 6,300 Mouse Oral NR Reproductive effects 6,300 Mouse Oral NR Reproductive effects 6,300 Monse Oral NR Reproductive effects 6,300 Mannal Oral NR Reproductive effects 6,300 Mannal Oral NR Reproductive effects 662 Mannal Oral NR Reproductive effects <td></td> <td>Rat</td> <td>Oral LD₅₀</td> <td>N.</td> <td>Mortality</td> <td>940</td> <td></td> <td>Sax, 1984</td>		Rat	Oral LD ₅₀	N.	Mortality	940		Sax, 1984
Rat Oral NR Reproductive effects 790 Rat Oral NR Reproductive effects 220 Rat Oral LD.50 NR Reproductive effects 220 Calf Oral LD.50 NR Reproductive effects 220 Mouse Oral NR Reproductive effects 2.5 Mouse Oral NR Reproductive effects 1,120 Mouse Oral NR Reproductive effects 6,300 Mouse Oral NR Reproductive effects 6,300 Mouse Oral NR Reproductive effects 4,800 Mouse Oral NR Reproductive effects 4,800 Mouse Oral NR Reproductive effects 4,800 Mouse Oral NR Reproductive effects 4,800 Mouse Oral NR Reproductive effects 4,800 Mannal Oral NR Reproductive effects 2,118 <		Mouse	Oral (chrone)	30 days	Decreased litter sizes with teratogenr: effects		100	Lecyk, 1980
Oral NR Reproductive effects 1,140 Oral NR Reproductive effects 1,100 Oral DS ₂₀ NR Reproductive effects 1,100 Oral (subchronic) 12-14 days Decreased fetal body weight 220 Oral NR Reproductive effects 1,170 Oral NR Reproductive effects 6,300 Oral NR Reproductive effects 4,800 Oral NR Reproductive effects 662 Oral NR Reproductive effects 662 Oral NR Reproductive effects 662 Oral NR Reproductive effects 662 Oral NR Reproductive effects 662 Oral NR Doct-asset egg laying ferthiby, decreased egg shell thickness 2,118	Lead	Kat	Oral	X !	Reproductive effects		06.	KIECS, 1993
Oral NR Reproductive effects 220 220		Kat	Oral	X !	Reproductive effects		1,140	KIECS, 1993
Oral (subchronix) 12 - 14 days Metroductive effects Coral LD20 NR Metroductive effects Coral (subchronix) 12 - 14 days Decreased fetal body weight Coral (subchronix) NR Reproductive effects Coral NR Reproductive effects Coral NR Reproductive effects Coral NR Reproductive effects Coral NR Reproductive effects Coral NR Reproductive effects Coral NR Reproductive effects Coral NR Reproductive effects Coral NR Reproductive effects Coral NR Reproductive effects Coral NR Reproductive effects Coral NR Reproductive effects Coral NR Reproductive effects Coral NR Reproductive effects Coral NR Reproductive effects Coral NR Reproductive effects Coral NR Reproductive effects Coral Coral NR Reproductive effects Coral Co		Kat	Oral	N.	Reproductive effects		02.5	KTECS, 1993
Decreased fetal body weight 2.5 1.120		rat C. K	2 12 0	A N	Meproductive effects	070	1,100	Kirch 1993
Oral (sucknitude) 1.1 1.		Dot	Oral (culphronic)	10 - 14 done	December of Carol body waight	277	25	McClain and Banker 1872
Oral NR Reproductive effects 6,300 Oral NR Reproductive effects 300 Oral NR Reproductive effects 4,800 Oral NR Reproductive effects 662 Oral NR Reproductive effects 2,118 Diet NR Docreased egg lability decreased egg shell thickness 4,61 [a]		Mone	Oral	AN AN	Remoductive effects		130	PTECS 1003
Oral NR Reproductive effects 300 Oral NR Reproductive effects 4,800 Oral NR Reproductive effects 662 Oral NR Reproductive effects 2,118 Diet NR Doctorassed egg plying fertility, decreased egg shell thickness 4,61 [a]		Mouse	- Tel	4 N	Reproductive effects		07717	RTECS, 1993
Oral NR Reproductive effects 4,800 Oral NR Reproductive effects 662 Oral NR Reproductive effects 2,118 Oral NR Doct reassed egg laying fertility, decreased egg shell thickness 2,118 Diet NR Doct reassed egg laying fertility decreased egg shell thickness 4,61 [a]		Monse	Orași Orași	N N	Reproductive effects		300	RTECS, 1993
Oral NR Reproductive effects Oral NR Reproductive effects Diet NR Docreased egg shell thickness Vi la	•	Mouse	Oral	N.	Reproductive effects		4,800	RTECS, 1993
Oral NR Reproductive effects 2,118 Diet NR Decreased egg shell thickness 6461 [a]		Domestic animal	Oral	NR	Reproductive effects		662	RTECS, 1993
Diet Decreased egg laying fertility; decreased egg shell thickness		Mammal	Oral	NR	Reproductive effects			RTECS, 1993
		Kestrel	Diet	NR	Decreased egg laying fertility; decreased egg shell thickness			Eisler, 1988

Table O-1.5 Ingestion Toxicity Information for Wildlife AOC 57

				Devens, Massachusetts			
Chemical	rest species	1681 1996	Duration	הוופנ	mg/kgBW-day Oral LDc. LOAEL	Subjethal KIV mg/kgBW-day LOAEL NOAEL	Kelerence
Lead (cont.)	Kestrel nestings	Oral	10 days	Reduced growth and brain weight; abnormal development		125	Eisler, 1988
	Japanese quail	Oral LD ₅₉	5 days	Mortality	24,752		Hill and Camardese, 1986
	Rat	Oral (chronic)	2 generations	Developmental effects		7	Kimmel et al., 1980 and
	Suite and	e I I e e		V(-+-)!:	130		Grant et al., 1980
	Rock dove	Oral (chronic)	SZ	Kidney rathology learning deficiences		6.75	Anders of all 1087 and
				3			Dietz et al., 1979
	Rock dove	Oral LD ₅₀		Mortality	375		Kendall and Scanlon, 1985
Manganese	Mouse	Oral (subchronic)	90 days	Delayed growth of testes		140	ATSDR, 19906
	Mouse	Oral (chrone)	ND Weeks	Mortality	410	0c0 *	ATSDR, 1990b
	Bat	Oral LD 50	20 days	Mortality	335		ATSDB 1990b
	Rat	Oral (subchronic)	20 days	Decreased litter weight during gestation		620	ATSDR. 1990b
	Rat	Oral (chronic)	103 weeks	Mortality		930	ATSDR, 1990b
	Guinea pig	Oral LD ₅₀	NR	Mortality	400		USEPA, 1984a
	Monkey	Oral (chronic)	18 months		L	\$2	ATSDR, 1990b
	Kodents/Irvestock	Oral (subchroux)	10 days - 2 months			100	Cunningham et al., 1966
Mercury	Mouse	Oral LD.	100 ttays	More Lior morality Mortality	72 7300		Granutsos and Murray, 1962 NIOSH, 1985
	Mouse	Oral (subchronic)	Day 6-17 (gest)	Stillbirths and neonatal death	•	4	Suzuki, 1979
	Rat	Oral (subchronic)	Day 6-14 (gest)	Retarded fetus growth		4	Suzuki, 1979
organomercury	Rat	Oral (chronic)	NR	Reduced fertility		5.0	Eisler, 1987a
	Rat p::-	Oral LD ₅₀	6	Mortality	18	3	NIOSH, 1985
organomercury	Mule der	Oral LD.	riegnany	right increases of studently Mortality	17.9	CT)	Eisler, 190/a
organomercury	River ofter	Oral LD ₅₀		Mortality	2		Eisler, 1987a
organomercury	Mink	Oral LD ₅₀	ı	Mortality			Eisler, 1987a
organomercury	Dog	Oral (subchronic)	Freguancy	High incidence of stulbuths		0.1	Eisler, 1987a
ethylmercury	Rock dove	Oral LD.		Mortality	22.8		Eisler, 1987a Fisler, 1987a
(Chicken	Oral LD.		Mortality	20		Finreite, 1979
	Bantam chicken	Oral LD ₅₀		Mortality	190		Fimreite, 1979
ethylmercury	Prairie chicken	Oral LD ₅₀		Mortality	11.5		Eisler, 1987a
etbylmercury	Chukar	Oral LD ₅₀		Mortality	26.9		Enler, 1987a
methylmercury	Mallard	Oral Legs	3 generation	Production behavior	:	0.064	FBICT, 198/4
methylmercury	Black duck	Oral (subchronic)	28 weeks	Reproduction inhibited		0.22 [a]	Eisler, 1987a
methylmercury	Fulvous whistling duck	Oral LD ₅₀		Mortality	37.8		Eisler, 1987a
methylmercury	Northern bobwhite	Oral LD ₅₉		Mortality	23.8		Eisler, 1987a
methylmercury	Bobwhite quail	Oral LD ₅₀	5 days	Mortality Mortality	523		Hill et al., 1975
ethylmercury	Gray partridge	Oral LDs		Mortality	17.6		Eisler, 1987a
organomercury	Gray pheasant	Oral (subchronic)	30 days	Reduced reproductive ability		0.64	Eisler, 1987a
methylmercury	Ring-necked pheasant	Oral LD ₅₀	£0.4	Mortality	11.5		Eisler, 1967a
2.2	Mouse	Oral (succinonic)	SU crays	Emotyoloxicity and tetatogeneity Remodingine effects		60	Suzukt, 1979 BTTPCS 1004
	Rat	Oral LD.	Z Z	Mortality	67	0,74	USEPA, 1985h
	Rat	Oral (chronic)	2 years	Decreased body weight gain		\$0	USEPA, 1985 b
	Rat	Oral LD ₅₀	NR 4	Mortality Montality	320		Sax, 1984
	Dog	Oral (chronic)	2 years	Histological lesions in bone marrow	to:	62.5	Hui and Camardese, 1986 USEPA, 1987
Selenium	Rat	Oral LD ₂₀	NR	Mortality	6,700	ļ	RTECS, 1993
	Rat	Oral LD ₅₀	X :	Mortality	138	;	Sax, 1984
	Mouse	Oral (subchronic)	3 months	Reproductive effects Reduced hatchability	_	134	RTECS, 1993
	Rat	Oral (chronic)	2 years	Decrease in breeding		0.2	ATSDR. 1988
	Rat	Oral (chronic)	NS	Histological changes in heart and kidney	י נ	0.045	Eisler, 1985
	Japanese quad	Oral (chronic)	NS.	Reduced egg hatching		0.6	Eisler, 1985
	Horse	Oral LD		MLD	3.3	0.72 U.30	Eisler, 1965 Fisler, 1985
	Mallard	Oral	6 weeks	Increased mortality	27 [9]		Heinz et al., 1988

Table O-1.5 Ingestion Toxicity Information for Wildlife AOC 57

Chestaid Targiènes Targi	Chemical	Test Species	Test Type	D	- J. J. L.	T 2 1 2 1	, L	
Miles			-A(+ ann+	Luranon	Piller		ouotethal KIV mg/kgBW-day AFI, NOAFI,	Reference
Marie	(100)	Hackmercaned night heren		82	NOARI for each fatchability	_]	0.61 [a]	Smith et al., 1988
Modern	Venedium (cont.)	Isononese anoil	OrallD	S days	Mortality Mortality	96		
Recommendation Continue Con	Vanadium	Japanese quan	Commer I D	One time	Markiter			ATSDR 1990-
Coloration Col		Mouse	Cavage LL 50	Olive name	T	24	¥	Suring of Venture 1086
Control Cont		Kai	Oral (subcaronic)	2 months	nypericusion		L	Demices 4-1 1086
Extract		Kat	Oral (subchronic)	scales co	Developmented elleris		١	D 4-1 1062
Rest		Cheken	Oral (subchronic)	0 Weeks	Decrease in egg -laying			Detg et al., 1903
Rest	Zinc	Kat	Oral LD _{S0}		Mortainy	Ĺ	000	KIECS, 1993
Rest		Rat	Oral	Gestation	Fetal resorptions in 4 to 20% of population		700	Shirker and Cox, 1900
Reit Oral Lighthensen) NR Metablity Rein Monta Oral Liby NR Metablity 223 Mallard Oral Liby NR Metablity 223 Mallard Oral Liby NR Metablity 223 Mallard Oral Liby NR Reproductive encryo metablity cracked agas 223 Rein Oral Liby NR Reproductive encryo metablity cracked agas 223 Rein Oral Liby NR Reproductive encryo metablity cracked agas 112 Rein Oral Liby NR Reproductive encryo metablity cracked agas 120 Rein Oral Liby NR Reproductive encryo metablity cracked agas 120 Rein Oral Liby NR Reproductive encryo metablity cracked agas 120 Rein Oral Liby NR Reproductive encryo metablity cracked agas 120 Rein Oral Liby NR Reproductive encryo metablity cracked agas 120 Rein Oral Liby NR Reproductive encryo metablity cracked a		Ferret	Oral	3-13 days	Mortality and gastrointestinal effects	_	į	Straube et al., 1980
Rest		Rat	Oral (subchronic)	NR	Kidney toxicity		160	Llobet, et al., 1988
Real On LDS NR Monthly E00 Hander On LDS NR Monthly E00 Hander On LDS NR Reproductive; endoys morefully, cracked eggs 2.61 Rated On LDS NR Reproductive; endoys morefully, cracked eggs 2.61 Rat On LDS NR Reproductive; endoys morefully, cracked eggs 2.61 Rat On LDS NR Reproductive; endoys morefully, cracked eggs 2.61 Rat On LDS NR Reproductive; endoys morefully, cracked eggs 2.61 Rat On LDS NR Reproductive 2.62 Rat On LDS NR Reproductive 2.62 Rat On LDS NR Reproductive 2.62 Rat On LDS NR Reproductive 2.60 Rat On LDS NR Reproductive 2.60 Rat On LDS NR Reproductive 2.60 Rat On LDS NR Reproductive 2.6								
Name	PESTICIDES/PCBs	100	תוניים	an	Monthsifts	800		RTECS, 1903
Miller	4,4 + UUE	Nat.	OLD LESS		Matth	900		PTECS 1993
Manuett		Mouse	Oral LD _{So}	NK ii	Mortality	000		nation 1993
Millard		Hamster	Oral LD ₅₀	X.	Mortality		į	KIECS, 1993
National Control National		Mallard	Ora	N.	Eggsbel tomang		167	USEFA, 1993
Retterd		Maliard	Oral	2 years	Reproductive: embryo mortalify, cracked eggs		0.58	USEPA, 1993c
Rat		Kestrel	Oral	NR.	Eggshell thinning	ڶ	0.39	USEPA, 1993c
Risk	4.4'-DDT (surrogate for	Rat	Oral LD.	NR.	Mortality	87		RTECS, 1993
Rat Oral NR Reproduction 112 Rat Oral NR Reproduction 112 Rat Oral NR Reproduction 1180 Rat Oral NR Reproduction 90 Rat Oral Log NR Reproduction 20 Rat Oral Log NR Reproduction 20 Mouse Oral Log NR Reproduction 20 Mouse Oral Log NR Reproduction 20 Mouse Oral Log NR Reproduction 20 Mouse Oral Log NR Reproduction 20 304 Mouse Oral Log NR Reproduction 20 304 Mouse Oral Log NR Reproduction 20 304 Mouse Oral Log NR Reproduction 20 304 Rebit Oral Log NR Reproduction 20 304 Rebit	44'-DDF) 2"444'-DDF)	to the	OrallD		Mortality	001		USEPA, 1985d
Rat Outal NR Reproductive 100 Rat Outal NR Reproductive 400 Rat Outal NR Reproductive 400 Rat Outal NR Reproductive 200 Rat Outal (Atomit) 3 pearst lious Reproductive 200 Rat Outal IDs NR Reproductive 200 Mounce Outal IDs NR Reproductive 200 Mounce Outal IDs NR Reproductive 200 Mounce Outal IDs NR Reproductive 200 Mounce Outal IDs NR Reproductive 200 Mounce Outal IDs NR Reproductive 200 Robbit Outal IDs NR Reproductive 200 304 Robbit Outal IDs NR Reproductive 200 304 Robbit Outal IDs NR Reproductive 200 304 Rob	(ממת דירווה ממת - דיר	1917	05-1-1-30	dN	Description		112	BTECS 1003
Rat Oral NR Reproductive 600 Rat Oral NR Reproductive 600 Rat Oral NR Reproductive 20 Rat Oral Log NR Reproductive 20 Rat Oral Log NR Reproductive 20 Mouse Oral Log NR Reproductive 20 Mouse Oral Log NR Reproductive 20 Mouse Oral Log NR Reproductive 20 304 Mouse Oral Log NR Reproductive 20 136 Rabbit Oral Log NR Reproductive 20 130 Rabbit Oral Log NR Reproductive 20 130 Rabbit Oral Log NR Reproductive 20 130 Cuil Log NR Reproductive 20 130 Cuil Log NR Reproductive 20 130 Cuil Lo		Nai	E 0	a a	D. Landing and D. Lan		101	PTECS 1003
Rat Oral NR Reproductive 1,200 Rat Oral NR Reproductive 1,200 Rat Oral NR Reproductive 2,200 Rat Oral NR Reproductive 2,200 Rat Oral (horal) NR Merchine 2,200 Mouse Oral Day NR Reproductive 2,00 5,00 Mouse Oral Day NR Reproductive 2,00 5,00 1,20 Mouse Oral Day NR Reproductive 2,00 1,20 1,20 Robbs Oral Day NR Reproductive 2,00 1,20 1,20 Robbs Oral Day NR Merching 2,00 1,20 1,20 Robbs Oral Day NR Merching 2,00 1,20 1,20 Robbs Oral Day NR Merching 2,00 2,0 1,20 Dog Oral Day NR Merching <t< td=""><td></td><td>Kat</td><td>Oral</td><td>N.</td><td>Neproductive</td><td></td><td>100</td><td>named 1993</td></t<>		Kat	Oral	N.	Neproductive		100	named 1993
Rat Oral NR Reproductive 200 Rat Oral NR Reproductive 200 Rat Oral NR Reproductive 200 Rat Oral LD2 NR Mortality 200 Mouse Oral LD2 NR Mortality 200 Mouse Oral LD2 NR Reproductive 200 Mouse Oral LD2 NR Reproductive 200 504 Mouse Oral LD2 NR Reproductive 200 136 Rabbit Oral LD2 NR Reproductive 200 130 Guine Part Oral LD2 NR Reproductive 200 130 Guine Part Oral LD2 NR Mortality 2500 130 Dos Oral LD2 NR Mortality 2540 2540 Dos Oral LD2 NR Mortality 2540 2540 Dos Oral LD2 NR Mortality <t< td=""><td></td><td>Rat</td><td>Oral</td><td>X.</td><td>Keproductive</td><td>•</td><td>430</td><td>KIECS, 1993</td></t<>		Rat	Oral	X.	Keproductive	•	430	KIECS, 1993
Rat Oral NR Reproductive 200 Rat Oral NR Reproductive 200 Rat Oral (abroni) 3 generations Reproductive 200 Rat Oral (broni) NR Reproductive 200 Mounte Oral Day NR Reproductive 200 Mounte Oral Day NR Reproductive 200 Mounte Oral Day NR Reproductive 200 124 Mounte Oral Day NR Reproductive 200 136 130 Rabbit Oral Day NR Reproductive 200 136 136 Rabbit Oral Day NR Metality 250 136 136 Day Oral Day NR Metality Approductive strue, reduced biblio, lack of mammary gland development and increased dead 236 Day Oral Day NR Reproductive feature, reduced biblio, lack of mammary gland development and increased dead 236 136 136 <		Rat	Oral	N.	Reproductive	i i	.890	KTECS, 1993
Rat Oral NR Reproductive 20 Rat Oral (checus) 3 spears ion Reproductive 20 20 Mointe Oral LD, NR Reproductive 20 504 Mointe Oral LD, NR Reproductive 20 504 Mointe Oral LD, NR Reproductive 20 504 Mointe Oral LD, NR Reproductive 20 504 Rabbit Oral LD, NR Reproductive 20 50 Rabbit Oral LD, NR Reproductive 20 50 Rabbit Oral LD, NR Mortality 5,000 130 Dog Oral LD, NR Mortality 5,000 1,10 Dog Oral LD, NR Mortality 1,20 1,4 (a) Dog Oral LD, NR Mortality 1,20 1,4 (a) Moillact Oral LD, NR Reduced segabell thickness 1,20 <td></td> <td>Rat</td> <td>Oral</td> <td>NR</td> <td>Reproductive</td> <td></td> <td>250</td> <td>RTECS, 1993</td>		Rat	Oral	NR	Reproductive		250	RTECS, 1993
Rat Oral (chronic) Sparentinus Reprecoductive 135 2.5 Motate Oral LD20 N.R Reproductive 200 504 Motate Oral LD20 N.R Reproductive 200 504 Motate Oral LD20 N.R Reproductive 200 148 Motate Oral LD20 N.R Reproductive 200 148 Motate Oral LD20 N.R Reproductive 200 150 Rabbit Oral LD20 N.R Reproductive 200 150 Guines pig Oral LD20 N.R Mortality 5500 150 Deg Oral LD20 N.R Mortality 5500 150 Deg Oral LD20 N.R Mortality 5500 150 Deg Oral LD20 N.R Mortality 5500 150 Deg Oral LD20 N.R Mortality 5500 150 Deg Oral LD20 N.R Mort		Rat	Oral	NR	Reproductive		20	RTECS, 1993
Rest Onl 2 yests Reproductive 2.7 Mouse Onl Do. NR Reproductive 200 3.04 Mouse Onl Do. NR Reproductive 200 3.04 Mouse Onl Do. NR Reproductive 200 3.04 Mouse Onl Do. NR Reproductive 200 1.04 Rebit Onl Do. NR Reproductive 200 1.04 Rabbit Onl Do. NR Reproductive 1.00 1.00 Rabbit Onl Do. NR Reproductive 1.00 1.00 Do. Onl Do. NR Mortality >5.00 1.00 Do. Onl Do. NR Mortality >5.00 1.00 Do. Onl Do. NR Mortality >5.00 1.1 1.00 Chicken Onl LDo. NR Reproductive success; toxic symptoms 4.00 1.1 1.1 Chinken Onl LDo. NR		Rat	Oral (chronic)	3 generations	Reproductive	L	0.5	IRIS, 1991
Notate Oral DB2 NR Mortality 155 Notate Oral DB2 NR Reproductive 200 504 Notate Oral DB2 NR Reproductive 200 148 Notate Oral DB2 NR Reproductive 200 148 Rabbit Oral DB2 NR Reproductive 200 148 Rabbit Oral DB2 NR Reproductive 200 150 Rabbit Oral DB2 NR Reproductive 250 150 DB3 Oral DB2 NR Merchildy 250 150 DB3 Oral DB2 NR NR Merchildy 250 150 DB3 Oral DB2 NR NR Merchildy 250 150 DB3 Oral DB2 NR Reproductive success; toxic symptoms 250 154 DB3 Oral DB2 NR Reproductive success; toxic symptoms 250 154 Chicken Oral LD2		Bat	Oral	2 vears	Remoductive		2.5	USEPA, 1993c
Monte Oral Labo Mortality 200 Monte Oral Lob NR Reproductive 200 Monte Oral Lob NR Reproductive 200 364 Monte Oral Lob NR Reproductive 200 124 Adabh Oral Lob NR Mortality 200 150 Rabh Oral Lob NR Mortality 200 150 Base Oral Lob NR Mortality 250 150 Dos Oral Lob NR Mortality 2500 150 Dos Oral Lob NR Reproductive 2500 150 Dos Oral Lob NR Mortality 2540 2540 Dos Oral Lob NR Reproductive 2540 2540 Chicken Oral Chicken NR Reproductive 2540 2540 Chicken Oral Lob NR Reduced eggabed Interest 400 214 [a]		Mense	OrallD	a z	Mortelity	135		RTECS, 1993
Mouse Oral NR Reproductive 504 Mouse Oral NR Reproductive 250 145 Mouse Oral NR Reproductive 250 145 Rabbit Oral LDs NR Reproductive 250 150 Rabbit Oral LDs NR Reproductive 250 150 Guinca pig Oral LDs NR Morality 5500 150 Hawter Oral LDs NR Morality 5500 150 Dog Oral LDs NR Morality 5500 154 Dog Oral LDs NR Morality 5500 154 Dog Oral LDs NR Morality 4500 154 15 Chaken Oral (chronic) 13 weeks Morality 4500 154 15 Money Oral (chronic) 2 years Reduced agabal thiskness 4500 234 25 Mallard Oral (chronic) <t< td=""><td></td><td>Menee</td><td>41120</td><td></td><td>Mortality</td><td>200</td><td></td><td>USEPA, 1985d</td></t<>		Menee	41120		Mortality	200		USEPA, 1985d
Montace Oral NR Reproductive 25 Montace Oral NR Reproductive 25 Montace Oral NR Reproductive 25 Montace Oral LDo NR Metality 25 Rabbit Oral LDo NR Metality 250 Bunnet Oral LDo NR Metality 250 Dog Oral LDo NR Metality 2500 Dog Oral LDo NR Metality 2540 Dog Oral LDo NR Reproductive etrus, reduced librido, lack of mammary gland development, and increased deaf 2540 Montality Dog Oral LDo NR Reproductive etrus, reduced librido, lack of mammary gland development, and increased deaf 2540 Montality Dog Oral LDo NR Reproductive etrus, reduced librido, lack of mammary gland development, and increased deaf 2540 Mallard Oral LDo NR Repared degraded librido and metality 2540 2540 Mallard Oral LDo <		TATOTAL	200	an	Description		\$04	PTECS 1003
Mounte Oral NR Approductive 124 Mounte Oral NR Reproductive 250 148 Mounte Oral LDs NR Metabity 250 150 Rabbit Oral LDs NR Metabity 250 150 Gual LDs NR Metabity 55000 150 150 Dog Oral LDs NR Metabity 55000 150 150 Dog Oral LDs NR Reproductive 250 250 154 Dog Oral LDs NR Reproductive 250 254 2540 Dog Oral LDs NR Reproductive 250 2540		Mouse	E 0	u n	D. Articles			PTECS 1803
Mouse Oral NR Reproductive 124 Rabhi Oral Da NR Mortality 200 148 Rabhi Oral Da NR Reproductive 200 150 Culuca pg Oral Da NR Mortality 200 150 Dog Oral Da NR Mortality 200 150 Dog Oral Da NR Mortality 200 150 Dog Oral Da NR Mortality 160 3540 Dog Oral Da NR Mortality 170 170 Dog Oral Da NR Mortality 170 170 Money Oral Da NR Mortality 170 174 18 Mallard Oral (abronic) 170 170 170 174 18 174 18 Mallard Oral (abronic) 170 170 170 170 170 170 170 170 170 <td< td=""><td></td><td>Mouse</td><td>Oral -</td><td>X !</td><td>Reproductive</td><td></td><td>1 3</td><td>KIECS, 1993</td></td<>		Mouse	Oral -	X !	Reproductive		1 3	KIECS, 1993
Mounte Oral NR Reproductive 250 156 Rabbit Oral LD-0 NR Mortality 250 150 150 Guinea pig Oral LD-0 NR Mortality >5,000 150 150 Hamster Oral LD-0 NR Mortality 150 3,540 150 150 Dog Oral LD-0 NR Reproductive 150 3,540 150 <t< td=""><td></td><td>Mouse</td><td>Oral</td><td>NK</td><td>Keproductive</td><td></td><td>+7T</td><td>KIECS, 1993</td></t<>		Mouse	Oral	NK	Keproductive		+7T	KIECS, 1993
Rabbit Oral LDs NR Mortality 20 150 Rabbit Oral LDs NR Reproductive 250 150 Guinea pig Oral LDs NR Mortality 55,000 150 Dog Oral LDs NR Mortality 55,000 150 Dog Oral LDs NR Mortality 20 35,540 Dog Oral Chronic) 14 months Sullbirths, delayed estrus, reduced libido, lack of mammary gland development and increased dead 35,540 Montality NR Mortality Andrality 4,000 91.4 [a] Chike Oral (chronic) 10 weeks Decreased reproductive estruction symptoms 4,000 2.240 2.240 Mallard Oral (chronic) 10 geasts Reduced eggeld litickness 2.240 2.240 2.240 Mallard Oral (chronic) NR Eggeld litickness 2.240 2.240 2.240 Mallard Oral (chronic) NR Eggeld litickness Andrality 2.240 2.240		Mouse	Oral	NR	Reproductive		148	K1ECS, 1993
Rabbit Oral LDs NR Reproductive 150 150 Bunster Oral LDs NR Mortality >5,000 5,500 Dog Oral LDs NR Mortality 60 3,540 Dog Oral LDs NR Reproductive 60 3,540 Dog Oral LDs NR Mortality 60 3,540 Dog Oral LDs NR Mortality 20 91.4 [a] Monkey Oral (alukhronic) 10 weeks Decreased reproductive success; toxic symptoms 4,000 91.4 [a] Rock doce Oral (alukhronic) 10 weeks Decreased reproductive success; toxic symptoms 4,000 91.4 [a] Mailard Oral (alukhronic) 10 weeks Decreased eproductive symptoms 4,000 0.14 [a] Mailard Oral (alukhronic) 36 days Reduced eggshell thickness 2240 2.24 Mailard Oral (alukhronic) 10 weeks Decreased terroductive symptoms 4,000 0.14 [a] Mailard Oral (alu		Rabbit	Oral LD ₅₀	NR	Mortality			KTECS, 1993
Guinca pig Oral LD20 NR Mortality Mortality Similar pig Oral LD20 NR Mortality Mortality Similar pig Oral LD20 NR Mortality Mortality Similar pig Oral LD20 NR Mortality M		Rabbit	Oral	NR	Reproductive		150	RTECS, 1993
Hamster Cral LD20 NR Mortality >5,000 Dog Oral LD20 NR Mortality 5,000 Dog Oral LD20 NR Reproductive 150 Dog Oral LD20 NR Reproductive 200 Dog Oral LD20 NR Rectain the control of the control		Guinea pig	Oral LDsn	NR	Mortality	150		RTECS, 1993
Dog Oral LD NR Metability 150 Dog Oral LD NR Reproductive 14 months Reproductive Dog Oral (chronic) 14 months Reproductive etcus, reduced libid o, lack of mammary gland development, and increased deat 12 Monkey Oral (chronic) 10 weeks Decreased ercoductive success; toxic symptoms 91.4 [a] Chicker Oral LD NR Rectuced eggshell thickness 4,000 91.4 [a] Rock dove Oral LD Archality Archality 1,2240 2.8 Mallard Oral (subchronic) 96 days Rectuced eggshell thickness 1,16 2.9 Mallard Oral (subchronic) 96 days Rectuced eggshell thickness 1,24 2.24 Mallard Oral (subchronic) 96 days Rectuced eggshell thickness 1,24 2.9 Mallard Oral (subchronic) 1,00 Mortality 1,40 1,45 Mallard Oral (chronic) 1,00 Mortality 1,20 0.56 Sandall (crase <		Hamster	Oral LD.	NR	Mortality	>5,000		RTECS, 1993
Dog		Dog	Oral LD	NR	Mortality	150		RTECS, 1993
Dog Oral L259 NR Reproductive Dog Oral L259 NR Reproductive Dog Oral Chronzi) 14 months Stillbirths, delayed estrus, reduced libido, lack of mammary gland development and increased deaf 12 12 13 14 15 14 15 15 15 15 15		8 20	Oral I D		Mortality	G		USEPA. 1985d
Dog Crail (chronic) 14 months Stillberthis, delayed estrus, reduced libido, lack of mammary gland development and increased deat 12		8 2	oral Lego	a z	Remoductive	_	.540	RTECS, 1993
Monte Oral LD29 NR Mortality Oral LD29 NR Mortality Oral LD29 NR Mortality Oral CD29 Oral		8 4	Oral (channis)	14 months	Cilliste delana defense defens enduced thirds lack of monumental and described	L	12	ATSDR 100%
Mortality Crail LD ₂ Neeks Mortality Mortal		Log S	Oral (chronic)	NT INCIDIO	STRIBBLES, URTAYER EST US, TERRICELLIONIS, TACK OF MADMALY BIABRI VEVELOPI	200 ment ann ment		DIECK 1903
Cock dock		Monkey	Olai LD50	N. C.	Proceedings of the state of the		01.4 [5.1	TISEBA 10854
Note that Note Pack done Crail LD ₂		Christen	Orai (succinonic)	10 weeks	Dear cased reproductive success, toak symptoms		71.7 [4]	TISEWS 1084
Mailard Oral (Antonin) 2 years Nectured eggstell thickness Mark dick Oral (Antonin) 2 years Nectured eggstell thickness NR Reduced eggstell thickness NR Regred thinning 1.16 1.1		ROCK dove	Oral LLDs		Mortality The state of the stat	L	13/14/0	Formation and Standall 1077
Mailard Oral LL2 ₃ Meteratory 7 Action 2.8 Mailard Oral (subchronic) 96 days Reduced eggshell thiskness 1.16 2.9 Mailard Oral NR Regabel thinning 2.91 2.91 Mailard Oral 2 years Reproductive 2.91 California qual Oral LD3 Mortality 8.41 I paparese qual Oral LD3 Mortality 8.41 Subchild rane Oral LD3 Mortality 1.334 Subchild rane Oral LD3 1.200 0.55a Kestrel Oral (chronir) 1 year Reduced eggshell thickness 1,200 0.55a Kestrel Oral (chronir) 1 years Reduced eggshell thickness 0.16 a 0.14 a Mouse Oral (chronir) 1 years Reduced eggshell thickness 0.14 a Rock doe Oral (chronir) 1 years Reduced eggshell thickness 0.14 a Rock doe Oral (chronir) NR Parental incubation behavior 0.9	- 4-1	Mack duck	Oral (chronic)	z years	Reduced eggsnen unxiness	J	7.7.1 (a)	TERMS 1084
Mailard Oral (subcincone) No cays Recented eggsted thinning Lo Mailard Oral - NR Eggshell thinning 291 Mailard Oral - NR Eggshell thinning 291 Mariality Mortality 841 1.45 Subclicrain Oral LDs Mortality 841 Subclicrain Oral LDs Mortality 1,334 Subclicrane Oral LDs Mortality 1,334 Subclicrane Oral Chrour) 7 wk - 1 yr Reduced eggshell thickness 0,55a Kestrel Oral (chrour) 1 year Reduced eggshell thickness 0,14 [a] Mouse Oral (chrour) 1 years Reduced eggshell thickness 0,14 [a] Mouse Oral (chrour) 1 years Reduced eggshell thickness 0,14 [a] Rock dove Oral (chrour) NR Retroductive 0,14 [a] Rock dove Oral (chrour) NR Parental incubation behavior 0,9		Mallard	Oral LDso		Mortaniy	7474	•	1
Mailard Oral NR Eggshell thinning 1.16 Mailard Oral NR Eggshell thinning 1.45 Mailard Oral 2 years Reproductive 1.45 California qual Oral LD ₂ Mortality 641 I-peasant Oral LD ₂ Mortality 641 Sandhill crane Oral LD ₂ Mortality 1,334 Kestrel Oral (chrour) 7 wk - 1 yr Reduced eggshell thickness 0,56a Kestrel Oral (chrour) 1 years Reduced eggshell thickness 0,16a Mouse Oral (chrour) 1 years Reduced eggshell thickness 0,16a Mouse Oral (chrour) 1 years Reduced eggshell thickness 0,16a Mouse Oral (chrour) 1 years Reduced eggshell thickness 0,16a Mouse Oral (chrour) 1 years Reduced eggshell thickness 0,16a Restred (chrour) 1 years Reduced eggshell thickness 0,16a Restred (chrour) 1 years Reduced eggsh		Mallard	Oral (subchronic)	96 days	Reduced eggshell taxkness		97	Longcore and Stendell, 1977
Mailard Oral NR Regached thinning 291 Mailard Oral 2 years Reproductive 1.45 California qual Oral LD ₂ Mortality 841 Ispanece qual Oral LD ₂ Mortality 841 Subbasses Oral LD ₂ Mortality 1,334 Subbasses Oral CLD ₂ Mortality 1,334 Kestrel Oral (chrour) 7 wk - 1 yr Reduced eggshell thickness 0,56a Kestrel Oral (chrour) 1 years Reduced eggshell thickness 0,16a Mouse Oral (chrour) 2 years Reduced eggshell thickness 0,14 al Mouse Oral (chrour) 1 years Reduced eggshell thickness 0,14 al Rock dow Oral (chrour) 1 years Reproductive 0,14 al Rock dow Oral (chrour) NR Parental incubation behavior 0,9		Mallard	Oral	NR	Eggshell thinning		1.10	USEPA, 1993c
Median Oral IDs 2 years Reproductive 1.45 California Oral IDs Mortality 641 641 I paracee qual Oral IDs Mortality 641 641 I paracee qual Oral IDs Mortality 1,334 1,334 Suchilicrane Oral IDs Mortality 1,200 0,56a Kestrel Oral (chrour) 7 wk - 1 yr Reduced eggshell thickness 0,56a Bern owl Oral (chrour) 1 year Reduced eggshell thickness 0,14 [and thickness] Mouse Oral (chrour) 1 years Reduced eggshell thickness 0,14 [and thickness] Mouse Oral (chrour) 1 years Reduced eggshell thickness 0,14 [and thickness] Mouse Oral (chrour) 1 years Reduced eggshell thickness 0,14 [and thickness] Rock dow Oral (chrour) 1 NR Reproductive 0,9 Rock dow Oral (chrour) 1 NR Parental incubation behavior 0,9		Mailard		NR	Eggshell thinning		2.91	USEPA, 1993c
California qual Oral LD ₂ Mortality SSS Papanece qual Oral LD ₂ Mortality 841 Pheasant Oral LD ₂ Mortality 1,334 Sandhil crane Oral LD ₂ Mortality 1,200 Kestrel Oral (chrour) 7 wk - 1 yr Reduced eggshell thickness 0,55a Restrel Oral (chrour) 1 year Reduced eggshell thickness 0,15a Mouse Oral (chrour) 2 years Reproductive 0,14 [a) Mouse Oral (chrour) NR Reproductive 0,29 Rock dove Oral (chrour) NR Parental incubation behavior 0,9		Mallard	Oral	2 years	Reproductive	_	1.45	USEPA, 1993c
Japanese quai Oral LD ₂		California quail	Oral LD ₅₀		Mortality	595		USF WS, 1984
Mortality Mortality Mortality Li334		Japanese quail	Oral LD ₅₀		Mortality	841		USFWS, 1984
Sandhill crane Oral LD_30 Mortality		Pheasant	Oral LD ₅₀		Mortality	1,334		USF WS, 1984
Kestrel Oral (shrouri) 7 wk - 1 yr Reduced eggshell thickness 0.55a		Sandhill crane	Oral LD ₅₀		Mortality			USFWS, 1984
Keatrel Oral (chrour) 1 year Reduced eggshell thekness 0.14 [a] Barn owl Oral (chrour) 2 years Reduced eggshell thickness 0.14 [a] Mouse Oral NR Reproductive 1.53 Cohecen Oral (chrour) NR Rebryook morbhido 0.9 Rock dove Oral (chrour) NR Parental incubation behavior 0.9		Kestrel	Oral (chrone)	7 wk - 1 yr	Reduced eggshell thickness	o ·).56a	USEPA, 1985d
Barn owl Oral (chronic) 2 years Reduced eggshell theknees 0.14 s Mouse Oral NR Reproductive 1.53 Chickern Oral (chronic) NR Embryonic mortality 6.09 Rock dove Oral (chronic) NR Parental incubation behavior 0.9	•	Kestrel	Oral (chronic)	l year	Reduced eggshell thekness	Ö	7.10a	Wiemeyer, et al., 1986
Mouse Oral NR Reproductive L.53 Rocked Oral (chrour) NR Embryonic mortality 0.9 1 Rock dove Oral (chrour) NR Parental incubation behavior 0.9 1		Barn owl	Oral (chronic)	2 years	Reduced eggshell thickness		0.14 [a]	Longcore and Stendell, 1977
Chicken Oral (chronic) NR Embryonic mortality 0.9 Rock dove Oral (chronic) NR Parental incubation behavior 0.9	Aroclor 1254 (surrogate for	Mouse	Oral	NR	Reproductive		1.53	USEPA, 1993c
Oral (chronic) NR Parental incubation behavior	Aroclor 1242 and 1260)	Chicken	Oral (chronic)	NR	Embryonic mortality		0.9	USEPA, 1976
		Rock dove	Oral (chronic)	NR	Parental incubation behavior		0.0	Peakall and Peakall, 1973

Table O-1.5 Ingestion Toxicity Information for Wildlife AOC 57

Remedial Investigation Report Devens, Massachusetts	T.CC
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Command Test Species Test Spec					Devens, Massachusetta			
America bloomed Ond closures (6 dept) National processes and closures Cond closures	Chemical	Test Species	Test Type	Duration	Effect	ng/kgBW-day	Subjethal RTV mg/kgBW-day	Reference
Mick Online Nick Good Mick Condition Mick Condition Mick Condition Mick Condition Mick Condition Mick Condition	Aroclor 1254 (cont.)	American kestrel	Oral (chronic)	69 days	Reduced sperm concentration	Of LUA LUAREL	LUAEL NUAEL	Fieler 1986
Mich Ond NR Reproduction 0.13 Chicken Ond NR Reproduction sufficility 2.43 2.43 Chicken Ond NR Reproduction sufficility 2.43 2.43 2.43 Chicken Ond NR Reproduction sufficility 2.43 2.43 2.43 2.43 2.44	()	Mink	Oral dose	160 days	Reproductive	-	0.096	USEPA, 1993c
Chickes Onlaid 12.2 days Reproduction and fettility 2.44 Chickes Onlaid 12.2 days Reproduction and fettility 2.44 Chickes Onlaid 18.84 Edge production and fettility 2.44 Privated Onlaid 18.84 Reproduction and benchability 2.45 Rest Onlaid 18.84 Meeting 1.50 1.50 Rest Onlaid 18.84 Meeting 1.50 1.50 1.54 Rest Onlaid 18.84 Meeting Rest and the second of the		Mink	Oral	NR	Kit growth		0.15	USEPA, 1993c
Cheken Onl 39 weeks Egg production and ferthility 244 Cheken Onl 18 m. Egg production and ferthility 244 Cheken Onl Day 18 m. Cheken 1317 1317 1314 <t< td=""><td></td><td>Mink</td><td>Oral</td><td>12.5 days</td><td>Reproductive</td><td></td><td>0.375</td><td>USPPA, 1993c</td></t<>		Mink	Oral	12.5 days	Reproductive		0.375	USPPA, 1993c
Christon Ordinal NR Eigenvorderine and latchability 2.3.1 1.3.1	-	Chicken	Oral	39 weeks	Egg production and fertility		2.44	USEPA, 1993c
Coling		Chicken	Oral	NR	Egg production and hatchability		8.6	USEPA, 1993c
Permant Oral Day New Color Egistrability 135		Chicken	Maternal diet	NR.	Chick growth		0.98	USEPA, 1993c
Rest Chal Libo N.R. Mechality Libit Rest Oral Libo N.R. Mechality Libit Rest Oral Libo N.R. Mechality Libit Rest Oral Libo N.R. Mechanics Libit Monte Oral Libo N.R. Mechanics Libit Monte Oral Libo N.R. Mechanics Libit Make Oral Libo N.R. Mechanics Libit Make Oral Libo N.R. Mechanics Libit Make Oral Libo N.R. Mechanics Libit Make Oral Libo N.R. Mechanics Libit Make Oral Libo N.R. Mechanics Libit Make Oral Libo N.R. Mechanics Libit Make Oral Libo N.R. Mechanics Libit Make Oral Libo N.R. Mechanics Libit Make Oral Libo N.R. Mechanics Libit Make Oral Libo N.R. Mechanics Libit Make Oral Libo N.R.	•	Pheasant	Oral	16 weeks	Egg hatchability		1.8	USEPA, 1993c
March Marc	Aroclor 1260	Rat	Oral LD ₅₀	X :	Mortality	1,315		RTECS, 1993
Part		Kat	Oral LDs	X X	Mortainty	200		Eisler, 1956
First		Kai D=4	Oral LD ₅₀	X Z	Mortality D	1,300		Eisler, 1956
Rain Chall (subktonis) 9 works Frist amending subtrant toxiby Chall (subktonis) 9 works Frist amending subtrant toxib Chall Manual Amending subtrant toxib		Rat	Oral (chronic)	2 nemerations	Reproductive citatis Reduced litter size		1,0/4	KIECS, 1993
Montante Oni ID. NR Perpoductive effects 4000 74 Mink Oni ID. Mortality 4000 7300 Mink Oni ID. Mortality 7300 7300 Mainte Oni ID. Mortality 7300 7300 Mainte Oni ID. NR Anality 7300 7300 Rat Oni ID. NR Anality 7400 7300 Rat Oni ID. NR Anality 7400 7400 Rabbit Oni ID. NR Anality 7400 7400 Rabbit Oni ID. Mortality 7400 7400 Rabbit Oni ID. Mortality 7400 7400 Rabbit Oni ID. Mortality 7400 7400 7400 Rat Oni ID. Advantality 7400 7400 7400 7400 Rat Oni ID. Advantality 7400 7400 7400 7400 7400 Rat Oni ID. 7400 7400		Rat	Oral (subchronic)	9 weeks	Fetal mortality: maternal toxicity		6.4	ATSDR 1987
Michaely Oni IDDs Mortality 3,000 Maik Oni IDDs Mortality 3,000 Maik Oni IDDs Mortality 3,000 Maik Oni IDDs 4 days Mortality 3,000 Rait Oni IDDs 4 days Mortality 4,00 Rait Oni IDDS 8 days Mortality 4,00 Rait Oni IDDS 8 days Mortality 3,00 Rait Oni IDDS Mortality 3,00 3,00 Rait Oni IDDS Advantaly Mortality 3,00 Coal Oni IDDS Advantaly 3,00 3,00 Animal Oni IDDS Advantaly 3,00 3,00 Animal Oni IDDS Advantaly Mortality 3,00 3,00 Animal Oni IDDS Advantaly Mortality 4,00 3,00 4,00 Animal Oni IDDS Advantaly Mortality 4,00 1,00 1,1 Anim		Mouse	Oral	NR	Reproductive effects	_	74	RTFCS 1994
Meint Onl ID Mortality Mortality 2000 Maint Onl ID Mortality Mortality 2000 Maint Onl ID Mortality Advantable 2000 Maint Onl IDO Reaching Mortality 2011 Rat Onl IDO New Carling 2011 2011 Rat Onl IDO Mortality 2011 2011 Day Mortality 2011 2011 2011 Day Onl IDO Mortality 2011 2011 Day Onl IDO 3day Mortality 2011 Graft Onl IDO 3day Mortality 2011 Mallerd Onl IDO 3day Mortality 2011 Mallerd Onl IDO 3day Mortality 2011 Mallerd Onl IDO 3day Mortality 2011 2011 Mallerd Onl IDO 3day Mortality 2011 2011 2011 Mallerd <td></td> <td>Mitk</td> <td>Oral LD.</td> <td></td> <td>Mortality</td> <td>4.000</td> <td></td> <td>Fisher, 1986</td>		Mitk	Oral LD.		Mortality	4.000		Fisher, 1986
Mink Co.1 LDs Monthly Monthly TSO 00075 Babeline Ch.1 LDs 6.497 Mortality 100 1-0 100		Mink	Oral LD.		Mortality	3,000		Eisler, 1986
Mulket Oral Libbonish 6 stoomth Ingrain of reproduction 0.0033 Mulket Oral Libbo 6 shy Mortality 111 6 Mulket Oral Libbo 8 shy Mortality 233 233 Rat Oral Libbo Mortality 334 334 334 Rabh Oral Libbo Mortality 334 334 334 Rabh Oral Libbo Mortality 230 230 230 Geat Oral Libbo Mortality 160 231 047 Apparent oral Libbo Shy Mortality 230 231 231 Apparent oral Libbo Shy Mortality 232 247 231 Mortality Mortality Mortality 233 247 231 247 Mortality Mortality Mortality Mortality 234 231 231 231 231 231 231 231 231 231 231 231 231		Mink	Oral LD		Mortality	750		Eisler, 1986
Relabelite Onal LDs, B, days Metality Metality 111 Rait Onal LDs, Onal LDs 1 days Metality 233 Rait Onal LDS Metality 233 Rait Onal LDS Metality 233 Rabbi Onal LDS Metality 233 Rait Onal LDS Metality 233 Rat Onal LDS Metality 230 Rat Onal LDS 5 days Metality 230 Rat Onal LDS 5 days Metality 23 Applace qual Onal LDS 5 days Metality 23 Mount Onal LDS 5 days Metality 23 Mount Onal LDS 5 days Metality 23 Mount Onal LDS 5 days Metality 23 Mount Onal LDS 5 days Metality 23 Mount Onal LDS 5 days Metality 23 Mount Onal LDS		Mink	Oral (subchronic)	4 months	Impaired reproduction		0.0075	Newell et al., 1987
Millard Onal LB2, on 10 Hz		Bobwhite	Oral LD ₅₀	8 days	Mortality	80		Eisler, 1986
Rat Cold LD50 NR metality 403 Rat Cold LD50 Metality 403 Rath Cold LD50 Metality 403 Rath Cold LD50 Metality 203 Rath Cold LD50 Metality 203 Rath Cold LD50 Metality 203 Rath Cold LD50 Metality 203 Reparencial Cold LD50 5 days Metality 20 Reparencial Cold LD50 5 days Metality 20 Reparencial Cold LD50 5 days Metality 20 Mount Cold LD50 5 days Metality 20 20 Mount Cold LD50 5 days Metality Metality 20 20 Mount Cold (dates) 2 year Helpsite cancer 20 20 20 Mount Cold (dates) 2 year Helpsite cancer Metality Metality Metality Metality Metality Metality<		Mallard	Oral LD ₅₀	& clays	Mortality	111		Eisler, 1986
Rat Column Mechality 353 Rabbit Column Mechality 350 Rabbit Column Mechality 350 Rabbit Column Mechality 350 Rat Column Mechality 350 Rat Column Mechality 350 Rat Column Mechality 350 Apparate Column 350 360 Mechality 360 Mechality 350 Manue Column 360 360 Monte Column 360 377 Monte Column 360 377 Monte Column 360 377 Monte Column 360 377 Monte Column 360 377 Monte Monte 360 377 Monte Act alignment with integrable of a part of a part of a part of a part of a part of a part of a part of a part of a part of a part of a part of a part of a part of a part of a part of a part of a part of a part of a part of a p	gamma - Chlordane (surrogate	Rat	Oral LD50	N.	Mortality	283		RTECS, 1993
Rabie	for alpha - chlordane)	Kat	Oral LD50		Mortality	430		Allen et al., 1979
Parameter Para		Rat	Oral LD50		Mortality Mattality	333		Allen et al., 1979
Dec. Col. Dispose Metality Metality Dec. Dispose Metality Dispose		Dathi	Oral I DS0		Mantality	3 2		Auen et al., 1979
Continue		Dog	Oral LD50		Mortality	000		Allen et al., 1979
Parameter qual		g cont	Oral LD50		Mortality	9		Allen et al. 1979
Preparent qual Ori LDO Stay Mactality Stay Mactality Stay Mactality Stay Mactality Stay Mactality Stay Mactality Stay Mactality Stay Mactality Stay Mactality Stay Mactality Stay Mactality Stay Mactality Stay Mactality Stay Mactality Stay Mactality Stay Mactality Stay Mactality Stay		Rat	Oral(subchronic)	Multi-generational			16	ATSDR. 1992a
Montace		Japanese quail	Oral LD50	5 days		35		Hill et al., 1975
Phesasant		Bobwhite	Oral LD50	5 days	Mortality	29		Hill et al., 1975
Mouse Oral (choosi) 2 years Metaliky months Metaliky mon		Mallard	Oral LD50	5 days	Mortality	62		Hill et al., 1975
Mounte Oral (chronity) 2 years Helpitechling hypitechoply and nercous 0.0475 0.057 <t< td=""><td></td><td>Pheasant</td><td>Oral LD50</td><td>•</td><td>Mortality</td><td>24</td><td></td><td>USFWS, 1984</td></t<>		Pheasant	Oral LD50	•	Mortality	24		USFWS, 1984
Mouse Carl (choose) 3 Vi months Regional Jores Papertopoly (females) Dog	•	Mouse	Oral (chrone)	2 years	Hepatocell uar hypertrophy and necrosis			ATSDR, 1992a
Young-chicken Chair (Infinity) 1 years Intitude of changed changed Actual (Infinity) 1 years Intitude of changed Actual (Infinity) 1 years Intitude of changed Actual (Infinity) 1 year Intitude of changed Actual (Infinity) 2 year Intitude of changed Actual (Infinity) 2 year Intitude of changed Actual (Infinity) 2 year Intitude of changed Actual (Infinity) 2 year Intitude of changed Actual (Infinity)		Motise	Oral (chrone)	30 months	Regional liver hypertrophy (females)			ATSDR, 1992a
Monse		Dog	Oral (chrone)	2 years	Histologic changes			USEPA, 1988a
Mouse Oral (chronic) 30 weeks Book transcent Accounted	District	Young chreken	Caronic	4 Week	Egg hatchaouny and growth	38	0.031	[b] Eisler, 1990
Oral (chronic) 2 year	- Assertion	Mouse	Oral (chronic)	A) weeks	Body framore	86	0.33	NCT 1978
Oral (chronic) 2 year Hepatic cancer 1.3 Oral (chronic) 2 year Hepatic cancer 2 Oral (chronic) 2 year Histologic changes 2 Oral (chronic) 2 year Liver laces 2 Oral (chronic) 2 year Liver laces 2 Oral (chronic) 2 year Liver laces 2 Oral (chronic) 2 year Liver laces 2 Oral (chronic) 2 year Liver laces 2 Oral (chronic) 2 year Liver laces 2 Oral (chronic) 4 xix Decreased 2 Oral (subchronic) 120 days Operant behavior 46 Oral LD ₂ NR Mortality 45 Oral LD ₂ NR Mortality 45 Oral LD ₂ NR Mortality 45 Oral LD ₂ NR Mortality 45 Oral LD ₂ NR Mortality 46 Oral LD ₂ NR Mortality 46 Oral LD ₂ NR Mortality 46 Oral LD ₂ NR Mortality 46 Oral LD ₂ NR Mortality 47 Oral LD ₂ NR Nr Nr Nr Oral LD ₂ NR Nr Nr Nr Oral LD ₂ NR Nr Nr Nr Nr		Mouse	Oral (chrone)	2 vear	Liver enlargement w/ histopathology		0.1	TRIS. 1991
Oral (chronic) 2 year Histologic changes 2 year Liver leasons 2 year 2 y		Mouse	Oral (chronic)	2 year	Hepatic cancer		1,3	ATSDR. 1991e
Oral (chronic) 2 year Liver lesions Oral (chronic) 2 year Liver lesions Oral (chronic) 2 year Liver lesions Oral (chronic) 2 year Liver lesions Oral (chronic) 2 year Liver lesions Oral (chronic) 2 year Liver seed bit liver/book weight Oral (chronic) 120 days Tremors and Convusions Oral (chronic) 120 days Tremors and Convusions Oral (subchronic) 14		Rat	Oral (chronic)	2 year	Histologic changes		7	ATSDR, 1987b
Oral (chronic) 2 year Increased liver weight: liver/hook weight Oral (chronic) 2 year Increased liver weight: liver/hook weight Oral (chronic) 25 months Hepatocyte degeneration 0.1		Rat	Oral (chronic)	2 year	Liver lesions			IRIS, 1991
Oral (chronic) 25 months Hepatecyte degeneration 0.5		Dog	Oral (chronic)	2 year	Increased liver weight; liver/body weight			IRIS, 1991
Oral (chronic) 120 chys Tremorts and Convuisions Oral (chronic) 120 chys Tremorts and Convuisions Oral (chronic) 120 chys Oracteated pup survival Oral (chronic) 120 chys Oracteated pup survival Oral LD ₂₀ NR Mortality 45 Mortality 45 Mortality 45 Mortality 45 Mortality 45 Mortality 45 Mortality 46 Mortality 47 Mortality 47 Mortality 48 Mortality 49 Mortality 49 Mortality 40 Morta		Dog	Oral (chronic)	25 months	Hepatocyte degeneration		0.5	ATSDR, 1987b
Oral LDs, NR Mortality		Monkey	Oral (chronic)	120 days	Tremors and Convisions		0.1	Smith et al., 1976
Oral LD_0		Mouse	Oral (subchronic)	4 W.KS	Decreased pup survival		_	Virgo & Bellward, 1975
pig Oral LD2, Oral LD3, NR NR Mortality 26 parrow Oral LD3, NR NR Mortality 45 parrow Oral LD3, NR NR Mortality 20 retide Oral LD3, NR NR Mortality 27 retide Oral LD3, NR NR Mortality 9 e qual Oral LD3, NR NR Mortality 6 [a] in qual Oral LD3, NR NR Mortality 6 [a] in qual Oral LD3, NR NR Mortality 9 in qual Oral LD3, NR NR Mortality 70 in qual Oral LD3, NR NR Mortality 9 in qual Oral LD3, NR NR Mortality 70		Kat	Oral (succinonic)	170 days	Operant behavior	¥	0.025	Smith et al., 1976
Oral LD2, NR Mortality 45		Guinea pio	Oral LD.	X X	Mortality	? ¥		Allen et al., 1979
parrow Oral LDs NR Mortality 45 revide Oral LDs NR Mortality 20 revide Oral LDs NR Mortality 9 cqual Oral LDs NR Mortality 6 (a) equal Oral LDs NR Mortality 0 in qual Oral LDs NR Mortality 9 it Oral LDs NR Mortality 9 it Oral LDs NR Mortality 70		Rabbit	Oral LD	N.	Mortality) 2		Allen et al., 1979
Oral LD ₂₀ NR Mortality 20 Oral LD ₂₀ NR Mortality 27 Oral LD ₂₀ NR Mortality 9 Oral LD ₂₀ NR Mortality 25 Oral LD ₂₀ NR Mortality 6 [a] Oral LD ₂₀ NR Mortality 9 Oral LD ₂₀ NR Mortality 9 Oral LD ₂₀ NR Mortality 79		House sparrow	Oral LD ₂₉	NR	Mortality	\$		USFWS, 1984
Oral LD.9 NR Mortality 27 Oral LD.9 NR Mortality 9 Oral LD.9 NR Mortality 25 Oral LD.9 NR Mortality 6 [a] Oral LD.9 NR Mortality 9 Oral LD.9 5 days Mortality 9 Oral LD.9 NR Mortality 79 Oral LD.9 NR Mortality 79		Chicken	Oral LD ₅₀	NR	Mortality	20		Allen et al., 1979
Oral LD ₂ NR Mortality 9 Oral LD ₂ NR Mortality 25 Oral LD ₂ 5 days Mortality 6 [a] Oral LD ₂ NR Mortality 70 Oral LD ₂ NR Mortality 9 Oral LD ₂ 5 days Mortality 79 Oral LD ₂ NR Mortality 79		Rock dove	Oral LD ₅₀	ZZ :	Mortality	27		USFWS, 1984
Oral LDs 5 days Mortality 6 [a] Oral LDs NR Mortality 70 Oral LDs NR Mortality 70 Oral LDs 5 days Mortality 70 Oral LDs NR Mortality 70		Gray partridge	Oral LD ₂₀	æ a	Mortality	٠,		USFWS, 1984
Oral LDs, NR Mortality 70 Oral LDs, NR Mortality 9 Oral LDs, 5 days Mortality 9 Oral LDs, NR Mortality 19 Oral LDs, NR Mortality 79		Tananese onail	Series Constitution	S dave	Mortality	9 9		USFWS, 1984
Oral LD ₅₀ NR Mortality 9 Oral LD ₅₀ 5 days Mortality 9 Oral LD ₅₀ NR Mortality 79		Japanese quai	Oral LD.	NR.	Mortality	6 C		Hill et al., 1973
Oral LD_{23} 5 days Mortality $\frac{3}{79}$ [a] [a] Oral LD_{23} NR Mortality $\frac{79}{79}$		California quail	Oral LD 50	NR	Mortality	۰		USFWS, 1984
Ora LD _O NR Mortality 79		Bobwhite	Oral LD ₃₀	5 days	Mortality	3		Hill et al., 1975
		Pheasant	Oral LD _s	N.	Mortality	26		USFWS, 1984

Table O -1.5 Ingestion Toxicity Information for Wildlife AOC 57

	Test Species	Test Type	Duration	Biffert	Lethal RTV mg/kgBW~day Oral LD _M LOAEL	Sublethal RTV mg/kgBW-day LOAEL NOAEL	Reference
	Mallard	Oral LD ₅₀	5 days	Mortality	1		Hill et al., 1975
	Mallard	Oral LD ₅₀	5 days	Mortality	[1] [a]		Hall et al., 1975
	Manaro Whisting deals	25.50	NA NA	Motoliti	100		11SFWS 1984
	Constant acces	0.5113	a N	Mortality	141		11SFWS, 1084
	Gost	Oral ID.	a N	Mortality	: 65		Allen et al., 1979
	Share	050110		Marteldte	5		Allenet al 1070
	Sate D	Oral 13	2 2	Martality	: 9		Allen et al. 1979
	Mainte	200	9	Mortelite	, K		Allen et al. 1970
	Mule acer	Oral LL 50	Y I	Motivatily	200		All C. 441 4070
	Cat Dog	Oral LD ₂₀	N N	Mortality Mortality	S96		Allen et al., 1979
	1	3					
ĭ	SEMIVOLATILE ORGANIC COMPOUNDS	;		:			
	Rat	LD ₅₀ , gavage oil	14 days	Mortality	3,800	900	AlsDR, 1992
	Mouse	Oral		Systemse, hepatocellular degeneration		200	A15DK, 1992
	Rat	Oral LD ₅₀		Mortality	1,630		NIOSH, 1985
	Rat	Oral (chronic)	40 days	Physiological changes		009	USEPA, 1984
	100	Oral (chronic)	Pregnamov	Sterility in offsmine		9	USEPA. 1984a
	ıvat	Oxal (carolic)	Carried State	Grand or China		: 5	115770 4 10842
	Kat	Oral (chronx)	3.5 months		L	<u>ج</u> آج	USEFA, 1904a
	Mouse	Oral	Multi – generational	Decreased fertility of F1 progeny; decreased F2 litter size.		<u>ء</u>	MacKenzie and Angevine, 1981
	Mouse	Oral (subchronic)	6 months	Mortality	120		ATSDR, 1993a
	Rodents	Oral (chronic)	NS	Carcinogenicity		9	Eisler, 1987
	7-6	(1)	97	Martille	30.690		RTECS 1003
	Kat	Oral LD 50	N. I	MOTUMITY	000,00		MIECS, 1993
	Rat	Oral	NR	Reproductive effects	ı	0 * 1,7	K1ECS, 1993
	Rat	Oral	Z,	Reproductive effects		35	RTECS, 1993
	Bat	Caro	N.	Remoductive effects		6,000	RTECS, 1993
						17.300	PTECS 1004
	Kat	Ora	Y.	Reproductive effects		1,,200	MIECS, 1993
	Rat	Oral	NR.	Reproductive effects		10,000	KTECS, 1993
	Rat	Oral	NR	Reproductive effects		9,766	RTECS, 1993
	Mouse	Oral LD.	NR	Mortality	30,000		RTECS, 1993
	NE-mark	200	di.	Daniel in affects		78 880	BTECS 1903
	Mouse	OIS.	W.	Nepromotive careta		2000	COLUMN TOTAL
	Mouse	E C	22	Neproductive creats		207'	Mirco, 1993
	Mouse	Oral	NR	Reproductive effects		20	RTECS, 1993
	Mouse	Oral	NR	Reproductive effects		1,000	RTECS, 1993
	Mouse	Oral	N.	Remoductive effects		2,040	RTECS, 1993
	D-11.4	417-0		Markelike	34,000		PTECS 1003
	Kabbit	Oral LD so	N.	Mortality	000,45		MIECU, 1993
	Gumea pag	Oral LD ₅₀	NK	Mortality	70,000		K1EC3, 1993
	Guinea pig	Oral	NR	Reproductive effects		20,000	KTECS, 1993
	Mammal	Oral	NR	Reproductive effects		20,000	RTECS, 1993
	Mammal	Oral	Z,Z	Reproductive effects		509,000	RTECS, 1993
	Mone	Oral I D.		Montality	008		RTECS, 1993
		Contratation Co.	of section	Daniel officials		125	PTECS 1003
	Moulee	Oral (Successions)	TO MCCWO	Mile Circles			Dislan 1087-
	Kodents	Oral (caronr)	22	Carcinogenanty			PART TOTAL
	Rodents	Single oral dose		LC 20	200		AlsDR, 19911
	Rodents	Oral (chronic)	13 weeks	LC 10	125		A1SDR, 1991f
	Mouse	Oral (chronic)	103 weeks	Multinuclear hepatocytes	,	09	ATSDR, 1991f
	Rat	Oral (subchronic)	48 days	Reproductive effects		125	USEPA, 1989a
	Bat	Oral (chronic)	1 Vear	Mortalito	009		IRIS, 1991
	Mana	O LINE	•	Montpilds	\$ 7.8		Sar 1084
	TATOMS	200		7 C 1/2-	000 65		See 1084
	Kat	Oral LD 50	!	Mortality	14,000		544 1904
	Kat	Oral LD ₅₀	N.	Mortality	2,000		K1ECS, 1994
	Mouse	Oral (subchronic)	90 days	Nephropathy; clinical and pathological effects		250 125	IRIS, 1990
	Rat	Oral (chronic)	100 weeks	Ocular lesions		141	USEPA, 1990a
	Rat	Oral (subchronic)	13 weeks	Decreased body weight gain	L.,	35.7	USEPA, 1990a
	Mente	Oralin		Mortalita	643		ATSIDE 1990ba
	Mouse	Oral LD 50		rate tains	866		POLICY TOOL
	Monse	Oral LD ₅₀	XX	Mortainy	(AV)	1	K15C3, 1994
	Mouse	Oral (subchronic)	6 months	Increased liver weight		120	USEPA, 1989a
	Rat	Oral LD ₅₀	NR	Mortality	2,700		RTECS, 1993
							and NIOSH, 1985
	Mone	G.11.00	an	Mortelite	5		PTECS 1993
	Monse	Of 21 17 50	144	PACITIONS	5000		TATACAN TOOL

Table O-1.5 Ingestion Toxicity Information for Wildlife AOC 57

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NOTES:

LD₂₀ = Doze resulting in 50% mortality in test population NOAEL = Lowest Observed Adverse Effect Level

BW = Body weight

NOAEL = No Observed Adverse Effect Level

NR = Not reported

Solve expected

Jacoure extended to see tallogram body weight by multiplying by ingestion and dividing by body weight. Body weight for birds obtained from Dunning, 1984.

Jacoure extended from 30 ppon to 11 mg/kgBW - day using standard default parameters (USEPA, 1988).

Converted from 30 ppon to 11 mg/kgBW - day using standard default parameters (USEPA, 1988).

Converted from 30 ppon to 11 mg/kgBW - day using standard default parameters (USEPA, 1988).



Table O-1.6
RTVs Selected for Ecological Risk Assessment (mg/kgBW/day) [a]
AOC 57

					Devens, Massachusetts	sachusetts						
		Small Mammal [b]			Small Bird [c]		Pre	Predatory Mammal [d	d]		Predatory Bird [e	[e]
Compound	Lethal	Sublethal Selected R'	RTV	Lethal	Sublethal Se	Selected RTV	Lethal	Sublethal Sele	Selected RTV	Lethal	Sublethal	Selected RTV
Inorganic Analytes												
Aluminum	740	425	425	740	425	425	740	425	425	740	425	42.5
Antimony	16,714	41.8	41.8	16,714	41.8	41.8	16,714	41.8	41.8	16,714	41.8	41.8
Arsenic	59	0.58	0.58	3.6	1	H	3.1	0.58	0.58	3.6	-	-
Barium	430	198	198	430	198	198	430	198	198	430	198	198
Beryllium	7	0.85	0.85	7	0.85	0.85	7	0.85	0.85	7	0.85	0.85
Cadmium	30	21.5	21.5	30	10	10	30	21.5	21.5	30	10	10
Chromium	40	3.5	3.5	25.2	200	25.2	40	3.5	3.5	25.2	200	25.2
Cobalt	18.2	4.2	4.2	18.2	4.2	4.2	18.2	4.2	4.2	18.2	4.2	4.2
Copper	188	100	100	188	100	100	188	100	100	188	100	100
Lead	09	2.5	2.5	75	125	75	09	2.5	2.5	75	125	75
Manganese	45	100	45	45	100	45	45	100	45	45	100	45
Mercury	3.6	0.0	0.0	2.9	0.064	0.064	0.2	0.1	0.1	2.9	0.064	0.064
Nickel	13	50	13	100	50	20	13	30	13	100	20	20
Selenium	78	0.2	0.2	2.7	0.6/1.75 [h]	0.6/1.75	28	0.2	0.2	2.7	9.0	9:0
Vanadium	9	8.4	9	19.2	11	11	9	8.4	9	19.2	11	H
Zinc	390	200	200	390	200	200	390	200	200	390	200	200
Pesticides/PCBs										,		
4,4'-DDD	17.4	0.2	0.2	119/448 [h]	0.14/1.16 [h]	0.14/1.16	12	12	12	119	0.14	0.14
4,4'-DDE	140	0.2	0.2	119/448 [h]	0.39/0.58 [h]	0.39/0.58	140	12	12	119	0.39	0.39
4,4'-DDT	17.4	0.2	0.2	119/448 [h]	0.14/1.16 [h]	0.14/1.16	12	12	12	119	0.14	0.14
Aroclor-1242	100	6.4	4.9	16/22.2 [h]	0.9	0.0	150	0.0075	0.0075	16	0	6
Arokor-1260	100	6.4	4.9	16/22.2 [h]	0.0	0.0	150	0.0075	0.0075	16	6	6
alpha-Chlordane	20	16	16	8.	0.031	0.031	40	16	16	4.8	0.031	0.031
gamma-Chlordane	20	16	16	4.8	0.031	0.031	40	16	16	4.8	0.031	0.031
Dieldrin	80	0.65	0.65	0.6/2.2 [h]	0.65	0.6/2.2	13	0.65	0.65	0.6	0.65	0.6
Semivolatile Organic Compounds												
1,2-Dichlorobenzene	760	NA	160	760	NA	160	760	NA	290	760	NA	1092
1,4-Dichlorobenzene	760	NA	760	760	NA	160	760	NA	1092	760	NA	160
2-Methyhaphthylene	326	10 [f]	10	326	10 [f]	10	326	10 [f]	10	326	10 [f]	10
Acenaphthylene	120 [1]	10 [f]	10	120 [f]	10 [f]	10	120 [f]	10 [1]	10	120 [f]	10 [1]	10
Benzo(b)fluoranthene	120 [f]	10 [4]	10	120 [t]	10 [4]	10	120 [f]	10 [t]	10	120 [f]	10 [1]	10
Benzo(k)fluoranthene	120 [f]	10 [4]	9 1	120 [f]	10 [1]	10	120 [f]	10 [f]	10	120 [f]	10 [f]	10
Bis(2-ethylhexyl)phthalate	160	35	33	160	33	33	160	33	33	160	35	35
Chrysene	120 [1]	10 [1]	10	120 [1]	[1] OI	10 5	120 [1]	[i] or	10	120 [1]	[1] or	10
Dibenzoluran	1.1	12.3 [8] 135	12.5	1.1	125	11	1.1	125	111	1 1	125	11
DI-II- out spiniatae	1:1	10 [6]	11	400	10 [6]	11.1	400	10 [6]	101	400	10 [4]	101
Nanhthalme	107	17 or 35.7	35.7	107	35.7	35.7	107	35.7	35.7	107	35.7	35.7
Phenanthrene	140	30 [f]	10	140	10 [f]	10	140	10 [1]	10	140	10 [1]	10
Pyrene	160	10 [f]	10	160	10 [1]	10	160	10 [1]	10	160	10 [1]	10
Volatile Organic Compounds												
1,2-Dichloroethylene	40	30	30	40	30	30	40	30	30	40	30	30
1,1,1-Trichloroethane	2,060	1,500	1,500	2,060	1,500	1,500	2,060	1,500	1,500	2,060	1,500	1,500
Acetone	009	273,000	009	009	273,000	009	009	273,000	009	009	273,000	009
Benzene	160	NA	160	760	NA	160	760	NA	160	760	NA	160
Carbon disulfide	NA	11	11	NA	11	11	NA	11	11	NA	11	11
Chlorobenzene	100	89	80	100	89	80	100	89	89	100	86	68

RTVs Selected for Ecological Risk Assessment (mg/kgBW/day) [a] Table 0-1.6 AOC 57

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					Devens, 1	Devens, Massachusetts						
		Small Mammal [b]	nal [b]		Small Bird [c]	[c]	Pr	Predatory Mammal [d	ımal [d]		Predatory Bird [e]	d [e]
Compound	Lethal		Sublethal Selected RTV	Lethal	Sublethal	Selected RTV	Lethal	Sublethal	Selected RTV	Lethal	Sublethal	Selected RTV
Chloroform	164	260	164	164	260	164	164	260		164	260	164
Ethylbenzene	700	291	291	700	291	291	700	291		700	291	291
Methylene chloride	320	52.6	52.6	320	52.6	52.6	900	52.6		009	52.6	52.6
Tetrachloroethylene	1,620	100	100	1,620	100	100	1,620	100		1,620	100	100
Toluene	1,000	76	76	1,000	76	9/	1,000	76	76	1,000	76	76
Trichloroethylene	480	750	480	480	750	480	480	750		480	750	480
Trichloroftuoromethane	350	35 [8]	35	350	35 [g]	35	350	35 [8]		350	35 [g]	35
Xylenes	860	200	200	2,014	200	200	860	200	200	2,014	200	200
Notes:												

[a] Lethal RTVs correspond to the boxed lethal RTV (one-fifth of the oral LD_{30} or the LOAEL) presented in Table __-5. When available, oral LD_{30} data were preferentially chosen. Sublethal RTVs correspond to the boxed sublethal RTV (LOAEL or NOAEL) presented in Table __-5.

[b] These RTVs represent chemical concentrations that are not anticipated to result in adverse effects for the short-tailed shrew, white-footed mouse, and muskrat. When available, sublethal LOAEL data were preferentially chosen.

(c) These RTVs represent chemical concentrations that are not anticipated to result in adverse effects for the American robin or mallard. When no data were available, the small mammal value

was used as a surrogate.

[d] These RTVs represent chemical concentrations that are not anticipated to result in adverse effects for the red fox or the raccoon. When no data were available, the small mammal value was used as a surrogate.

[e] These RTVs represent chemical concentrations that are not anticipated to result in adverse effects for the barred owl or great blue heron. When no data were available, the small bird or predatory mammal value was used as a surrogate.

[f] The value for benzo(a)pyrene was used as a surrogate.
[g] A sublethal RTV was derived by applying a factor of 0.1 to the lethal RTV, which is expected to be protective of 99% of the population (USEPA, 1986).
[h] When injestion toxicity data were available for mallards, these data were data were data may have been selected for evaluating food chain effects to mallards; other (more conservative) effects data may have been selected for evaluating food chain exposures to all other bird species.

 $LD_{50} = Median lethal dose.$

LOAEL = Lowest Observed Adverse Effect Level

NOAEL = No Observed Adverse Effect Level.

RTV = Reference toxicity value.

NA = Not available.

TABLE O-1.7 SUMMARY OF TOXICITY DATA FOR PLANT RECEPTORS AOC 57

72.200 (10.00 a.c.)	Devens, Massachusetts	
Chemical	Reference	RTV in soil [a] (µg/g)
INORGANICS		(#BB)
Aluminum	Will and Suter, 1994	50
Antimony	Will and Suter, 1994	
Arsenic	•	5
Barium	Will and Suter, 1994	10
Beryllium	Will and Suter, 1994	500
Cadmium	Will and Suter, 1994	10
	Will and Suter, 1994	3
Chromium Cobalt	Will and Suter, 1994	1
	Will and Suter, 1994	20
Copper	Will and Suter, 1994	100
Lead	Will and Suter, 1994	50
Manganese	Will and Suter, 1994	500
Nickel	Will and Suter, 1994	30
Selenium	Will and Suter, 1994	1
Vanadium	Will and Suter, 1994	2
Zinc	Will and Suter, 1994	50
PESTICIDES/PCBs		
4,4'-DDE		12.5 [b]
4,4'-DDT	Eno & Everett, 1958	12.5
Aroclors	Will and Suter, 1994	40
Dieldrin		12.5 [b]
SEMI-VOLATILE ORGANICS		
1,2-Dichlorobenzene	Hulzebos et al., 1993 [d]	248
1,4-Dichlorobenzene	Hulzebos et al., 1993 [d]	248
2-Methylnaphthalene		25 [c]
Bis(2-ethylhexyl)phthalate	Hulzebos et al., 1993 [d]	>1,000
Dibenzofuran	Hulzebos et al., 1993 [d]	617 [e]
Di-n-butylphthalate	Will and Suter, 1994	200
Fluoranthene	·	25 [c]
Naphthalene	Hulzebos et al., 1993 [d]	100
Phenanthrene		25 [c]
Pyrene		25 [c]
VOLATILE ORGANICS		
1,2-Dichloroethylene		>1,000 [f]
Acetone		NA
Chloroform		>1,000 [f]
Ethylbenzene		200 [g]
Methylene chloride		>1,000 [f]
Tetrachloroethylene	Hulzebos et al., 1993 [d]	>1,000 [1]
Toluene	Will and Suter, 1994	200
Trichlorofluoromethane	· · · · · · · · · · · · · · · · · · ·	NA
Xylene (total)	Hulzebos et al., 1993 [d]	>1,000
	114120000 01 al., 1773 U	

- [a] RTVs in soil are equal to chemical concentrations in soil that are not expected to result in adverse effects to plants.
- [b] Value for 4,4'-DDT used as a surrogate.
- [c] Value for acenaphthene used as a surrogate.
 [d] Values represent 14—day growth EC₅₀s for *Lactuca sativa* in soil.
 [e] Value for furan used as a surrogate.
- [f] Value for tetrachloroethylene used as a surrogate.
- [g] Value for toluene used as a surrogate
- NA = Not available

TABLE O – 1.8 SUMMARY OF TOXICITY DATA FOR TERRESTRIAL INVERTEBRATE RECEPTORS AOC 57

				Devells, Massacillusetts	CHUSCIES		
Chemical	Test	Test	Test	Chemical	Bifect	KIV Z. Z. Z.	
	2461	- :	. 17			4-8/8)	word clice
INORGANICS		000000000000000000000000000000000000000	The county of th			1	
Aluminum	NA	NA	NA	NA	NA	NA	NA
Antimony	NA	NA	NA	NA	NA	NA	NA
Arsenic	Soil Test	14 day	E. foetida	100	0 % mortality	100	Bouche et al., 1987
Arsenic	Soil Test	14 day	E. foetida	200	100 % mortality		Bouche et al., 1987
Barium	NA	NA	NA	NA	NA	NA	NA
Beryllium	NA	NA	NA	NA	NA	NA	NA
Cadmium	Soil Test	14 day	E. foetida	006	0 % mortality		Bouche et al., 1987
Cachnium	Soil Test	14 day	E. foetida	2,700	100 % mortality		Bouche et al., 1987
Cadmium	Soil Test	14 day	E. foetida	1,000 [a]	1,57		van Gestel and van Dis, 1988
Cadmium	Soil Test	20 week	E. foetida	50 [b]	Decrease in cocoon production	tion 50 [c]	Malecki <i>et al.</i> , 1982
Cadmium	Soil Test	2 week	E. foetida	1,843	£0,3		Neuhauser et al., 1985
Chromium (III)	Soil Test	8 week	E. foetida	250	Reproduction 50% inhibited		Molnar et al., 1989
Cobalt	NA	NA	NA	NA	NA	NA	NA
Copper	Soil Test	14 day	E. foetida	10	0 % mortality		Bouche et al., 1987
Copper	Soil Test	14 day	E. foetida	93	20 % mortality	30	Bouche et al., 1987
Copper	Soil Test	20 week	E. foetida	2,000 [b]	Decrease in cocoon production	tion	Malecki et al., 1982
Copper	Soil Test	2 week	E. foetida	643	LCs		Neuhauser et al., 1985
Lead	Soil Test	20 week	E. foetida	5,000 [b]	Decrease in cocoon production		Malecki et al., 1982
Lead	Soil Test	2 week	E. foetida	5,941	LC ₅₀	1,190 [c]	Neuhauser et al., 1985
Manganese	NA	NA	NA	NA	NA	NA	NA VA
Nickel	Soil Test	20 week	E. foetida	400 [b]	Decrease in cocoon production	tion 400	Malecki et al., 1982
Nickel	Soil Test	2 week	E. foetida	757	LC_{s_0}		Neuhauser et al., 1985
Selenium	NA	NA	YA :	YZ :	NA	NA	NA
Vanadium	NA 	NA	NA 	NA	NA .	NA	NA
Zinc	Soil Test	20 week	E. foetida	5,000 [b]	Decrease in cocoon production		Malecki et al., 1982
Zinc	Soil Test	2 week	E. foetida	299	LC_{50}	130 [c]	Neuhauser et al., 1985
PESTICIDES/PCBs							
4,4'-DDE	Soil Test	NS	SN	99	58% mortality	12 [c]	U.S. EPA, 1985
4,4'-DDT	Soil Test	NS	NS	99	58% mortality	12 [c]	U.S. EPA, 1985
Aroclor – 1242	NA	NA	NA	NA	NA	NA	NA
Aroclor-1260	NA	NA	NA	NA	NA	NA	NA
Dieldrin	Soil Test	89 day	E. foetida	10	6 % decrease in number of cocoons hatched	cocoons hatched	Reinecke and Venter, 1985
Dieldrin	Soil Test	89 day	E. foetida	93	26 % decrease in number of coc	fcoc 30	Reinecke and Venter, 1985
Dieldrin	Soil Test	89 day	E. foetida	100	36 % decrease in number of cocoons hatched;	cocoons hatched;	Reinecke and Venter, 1985
Dieldrin	Soil Test	89 day	E. foetida	100	50 % decrease in number of cocoons produced	f cocoons produced	Reinecke and Venter, 1985
SEMI-VOLATILE ORGANIC COMPOUNDS	RGANIC COMPOU	JNDS					
1,2-Dichlorobenzene	NA	NA	NA	NA	NA	NA	NA
1,4-Dichlorobenzene	NA	NA	NA	NA	NA	NA	NA
2-Methylnaphthalene	Soil Test	14 day	E. foetida	173	LC.	34 [d]	Neuhauser et al., 1985.
Dibenzofuran		NA	NA	NA	NA	NA	NA
Bis(2-ethylhexyl)phthalate	te Soil Test	14 day	4 test species	2,390	LC.	478 [e]	Neuhauser et al., 1986.
DI-n-outyiputnalate	Soli Test	14 day	4 test species	0,550	L.50	4/8 e	Neuhauser et al., 1986.





TABLE O – 1.8 SUMMARY OF TOXICITY DATA FOR TERRESTRIAL INVERTEBRATE RECEPTORS AOC 57

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				Devens, Massachusetts	chusetts		W WANTED AND THE PARTY OF THE P
20.000.000.000.000.000.000.000.000.000.	- T-	Trait	Theet	Chemins.	Hifect	RTV	
Chemical	ا دی		3				
	Type	Duration	Species	Concentation		(466)	
				(ug/g)			
	Coil Teat	14 day	F. foetida	173	LC.	34 [d]	Neuhauser et al., 1985.
	100	14 day	E foatide	173	ا ا		Neuhauser et al., 1985.
Naphthalene	Soil lest	14 day	E. locilua	677	} } •		Neuhauser et al 1985
Phenanthrene	Soil Test	14 day	E. foetida	1/3	L.50	豆 表 ?	NI1
	Soil Test	14 day	E. foetida	173	LC_{50}		Neunauser et al., 1905.
VOI ATTLE ORGANIC COMPOUNDS	POUNDS						1000
Chloroform	Soil Test	14 day	E. foetida	740	Ľ	150 [d]	Neuhauser et al., 1985.
	100		į.	707	3	21 [4]	Neuhauser et al. 1985.
Ethylbenzene	Soil Test	14 day	E. foetida	100	LX-50	[1] [1]	Mantenant of the 1085
oride	Soil Test	14 day	E. foetida	740	LC	150 [d]	Neunauser et al., 1905.
	Coil Test	14 day	E foetida	740	, C	150 [d]	Neuhauser et al., 1985.
I etrachioroemyiene	COIL LEST	1+ 143		30,0) •	21 [6]	Neuhauser et al. 1985.
Toluene	Soil Test	14 day	E. foetida	100	. S	[h] 17	NIA
Tuoromethane	NA	NA	NA	ZA A	NA	NA.	Y
	Soil Test	14 day	E. foetida	106	Z,	21 [d]	Neuhauser et al., 1985.
(ration (count)		•			:		
TOTAL PETROLEUM HYDROCARBONS	ROCARBC	SN(,	
Total Petroleum Hydrocarbons NA	AN	NA	NA	NA	NA	NA	NA
Tomor and Tamor							

NOTES:

[a] LC₅₀ value for soil at pH = 7.0; LC₅₀ = 320 ug/g – 560 ug/g for soil pH = 4.1

[c] Conservative factor of 0.2 applied to endpoint; resultant value should be protective of 99.9% of the exposued population from acute effects (USEPA, 1986).
 [d] Equal to the lowest LC₅₀ in each chemical class, multiplied by a safety factor of 0.2, as described in text. Value for 2—chloroethyl vinyl ether used for all chlorinated volatiles. Value for carbaryl used for aromatic hydrocarbons. Value for fluorene used for PAHs. Value for carbaryl used for aromatic hydrocarbons.
 [e] Mean of LC₅₀s for four test species (A. teberculata, E. foetida, E. eugeniac, and P. excavatus) from artificial soil tests, values used for a whole chemical class are multiplied by a factor of 0.2 (Neuhauser et al., 1986). Value for dimethylphthalate used for phthalates.

NS = Not stated

Table 0.1–9 AQUIRE Freshwater Toxicity Information ($\mu g/L$) AOC 57

		Devens, Massachusetts					
Chemical Name	Species	Age	Exposure	Effect	Effect Concentration	AQUIRE Reference	Year of
	4	•	-		Lethal Sublethal	Number	Publication
PAL Volatile Organics	Drankair account united flac	# # # # # # # # # # # # # # # # # # #	78 17	٢	20 02		: 0
1,1-Delitorocaryiene	Dapinia inagira, water rica	THE CT DICTAR	11 77	ر د د	11,000		2 6
	Daphilia magna, water flea	FIRST INSTAR	24 II	Pethality	2 400		00
	Daphilla magna, water fles	C34 H	24 H	I C.	08 000		8 8
	Darbnia magna, water flea	FIRST INSTAR	48 H	8 C	11600		8 8
	Lenomis macrochins bluevill	33-75 MM	H 96		220.000		77
	Lenomis macrochirus hibeoili	HIVENIE 0.32-1.2G	24 H	0 0 0 0 1	74.000		: 2
	Lebomis macrochirus, bluegill	JUVENILE, 0.32-1.2G	H 96	r c	74,000		81
	Lepomis macrochirus, bluegill	JUVENILE, 0.32-1.2G	H 96	LC	140,000		81
	Lepomis macrochirus, bluegill	JUVENILE, 0.32-1.2G	24 H	rog Tog	165,000		81
	Pimephales promelas, fathead minnow	0.8 G, 35 MM, ADULT	8D	ron Total	29,000		80
	Pimephales promelas, fathead minnow	ADULT, 0.8 G, 35 MM	H 96	C.J.	169,000		80
	Pimephales promelas, fathead minnow	0.8 G, 35 MM, ADULT	13 D	rc ¹⁰	29,000		80
	Pimephales promelas, fathead minnow	ADULT, 0.8 G, 35 MM	SD	LC.	97.000		80
	Pimephales promelas, fathead minnow	ADULT, 0.8 G, 35 MM	24 H	LC ₃₀	116,000		80
	Pimephales promelas, fathead minnow	ADULT, 0.8 G, 35 MM	6D	LC ₅₀	74,000		80
	Pimephales promelas, fathead minnow	0.8G, 35 MM, ADULT	10 D	Γ_{S_0}	29,000		80
	Pimephales promelas, fathead minnow	ADULT, 0.8 G, 35 MM	7D*	Γ_{50}°	29,000		80
	Pimephales promelas, fathead minnow	0.8 G, 35 MM, ADULT	12 D	Γ_{50}°	29,000		80
	Pimephales promelas, fathead minnow	ADULT, 0.8 G, 35 MM	48 H	ΓC_{50}	169,000		80
	Pimephales promelas, fathead minnow	ADULT, 0.8 G, 35 MM	48 H	$^{1}C_{50}$	108,000		80
	Pimephales promelas, fathead minnow	0.8 G, 35 MM, ADULT	H 96	$^{\mathrm{LC}_{30}}$	108,000		80
	Pimephales promelas, fathead minnow	0.8 G, 35 MM, ADULT	9D	LÇ,	29,000		80
	Pimephales promelas, fathead minnow	ADULT, 0.8 G, 35 MM	24 H	$\Gamma_{S_0}^{\circ}$	175,000		80
	Pimephales promelas, fathead minnow	0.8 G, 35 MM, ADULT	11D	$\Gamma_{50}^{\rm c}$	29,000		80
	Scenedesmus abundans, green algae	10E4 CELLS/ML	H 96	GRO	410,000	0	82
Chlorobenzene	Brachydanio rerio; zebrafish;	FERTILIZED EGG	14D	REP •	8,500 213279	90	
	Brachydanio rerio: zebrafish:	FERTILIZED EGG	21 D	REP *	8,500 213279		
	Brachydanio rerio; zebrafish;	FERTILIZED EGG	28 D	LC			
	Brachydanio rerio; zebrafish;	FERTILIZED EGG	28 D	REP *			
	Brachydanio rerio; zebrafish;	FERTILIZED EGG	7D	REP •			
	Brachydanio rerio; zebrasish;	NR	48 H	LC30			
	Carassins auratus; Goldfish;	3.8-6.4 CM, 1-2G	24 H	ΓC_{50}			
	Carassius auratus; Goldfish;	3.8-6.4 CM, 1-2G	48 H	$^{1}C_{50}$			
	Carassius auratus; Goldfish;	3.8-6.4 CM, 1-2G	H 96	10.50			
	Carassus auratus; Goldfish;	, c	Uc./	ς, τ τ	1,040 210338	6/ 6/	
	Calabbits aurants, Coldibit,	000	7 7 H 78	8 J			
	Carassius auratus: Goldfish:	BGG	84 H	0 0 0 0 1			
	Carassius auratus: Goldfish:	EGGS-4D POST HATCH	8D	ros.			
	Carassius auratus: Goldfish:	EGGS-4 D POST HATCH	8D	L Con			
	Carassins auratus: Goldfish:	EGGS-4D POST HATCH	H 96				
	Carassius auratus; Goldfish;	EGGS-4D POST HATCH	H 96	rc ³⁰	3,480 210563		
	Ceriodaphnia dubia; Water flea	NEONATE	48 H	L C	10,400 310810		
	Ceriodaphnia dubia; Water slea	NEONATE	48 H	Γ_{S0}^{C}			
	Ceriodaphnia dubia; Water slea	NEONATE	48 H	rc,			
	Ceriodaphnia dubia; Water Ilea	NEONATE	48 H	9. 57.		10 85	
(Ceriodaphnia dubia; Water Ilea	NEONATE	48 H	05 I	11,800 310810	<u>د</u> و	
	Ceriodapinnia dubia; water nea	MECHAIR	1 0+	05/77			



Table O.1–9 AQUIRE Freshwater Toxicity Information (µg/L) AOC 57

		Devens, Massachusetts	tts		Hffect	,	АОТПВЕ	Vear
Chemical Name	Species	Age	Exposure	Effect	Concentration		Reference	jo
					Lethal	Sublethal	Number	Publication
	Ceriodaphnia dubia; Water flea	NEONATE	48 H	$\Gamma C_{\xi l}$	7,900	310810	85	
	Ceriodaphnia dubia; Water flea	NEONATE	48 H	ΓC_{50}	8,900	310810	85	
	Ceriodaphnia dubia; Water flea	NEONATE, <12 H	168 H	LC30	24,000	210212	91	
	Ceriodaphnia dubia; Water flea	NEONATE, <12 H	48 H	ΓC_{50}	47,000	210212	91	
	Ceriodaphnia dubia; Water flea	NEONATE, <12 H	to 10 D	EC50RE *	14,000	210212	91	
	Ceriodaphnia dubia; Water flea	NEONATE, <12 H	to 10 D	EC50RE *	22,000	210212	91	
	Ceriodaphnia dubia; Water flea	NEONATE, <12 H	to 10D	ECSORE *	26,000	210212	91	
	Ceriodaphnia dubia; Water flea	NEONATE, <12 H	to 10 D	MOR *	3,890	210212	91	
	Ceriodaphnía dubia; Water slea	NEONATE, <12 H	to 10 D	REP *	12,000	210212	91	
	Ceriodaphnia dubia; Water flea	NEONATE, <12 H	to 10 D	REP *	19,000	210212	91	
	Ceriodaphnia dubia; Water flea	NEONATE, <12 H	to 10 D	REP *	19,000	210212	91	
	Culex quinquesasciatus; Mosquito	LARVAE, 4TH INSTAR	24 H	BCF	1.01	212480	75	
	Cyclotella meneghiniana; Diatom	EXPO GRO PHASE	48 H	₽C50 *	235,740	210088	91	
	Daphnia magna; Water flea;	12 H	14D	EC50RE *	2,500	315526	83	
	Daphnia magna; Water flea;	24 H	24 H	LC	310,000	215718	77	
	Daphnia magna; Water flea;	<24 H	24 H	LCS	140,000	215184	80	
	Daphnia magna; Water flea;	<24 H	48 H	LC	86,000	215184	80	
	Daphnia magna; Water flea;	<24 H	48 H	MOR*	10,000	215184	80	
	Daphnia magna; Water flea;	NEONATE	48 H	LC	10,700	310810	85	
	Daphnia magna; Water flea;	NEONATE	48 H	LCS	11,500	310810	85	
	Daphnia magna; Water flea;	NEONATE	48 H	LCI	12,800	310810	85	
	Daphnia magna; Water flea;	NEONATE	48 H	LC	12,900	310810	85	
	Daphnia magna: Water flea:	NEONATE	48 H	LC	13,000	310810	85	
	Daphnia magna: Water flea:	NEONATE	48 H	LCs	15,400	310810	85	
	Daphnia magna; Water flea;	NEONATE	48 H	LC	21,300	310810	85	
	Daphnia magna; Water flea;	NEONATE	48 H	LCJ	8,600	310810	85	
	Daphnia magna; Water flea;	NEONATE, <12 H	240 H	LC50	16,000	210212	91	
	Daphnia magna; Water flea;	NEONATE, <12 H	48 H	LC30	31,000	210212	91	
	Daphnia magna; Water flea;	NEONATE, <12 H	to 11 D	EC50RE *	15,000	210212	91	
	Daphnia magna; Water flea;	NEONATE, <12 H	to 11 D	ECSORE *	16,000	210212	91	
	Daphnia magna; Water flea;	NEONATE, <12 H	to 11 D	EC50RE *	19,000	210212	91	
	Daphnia magna; Water flea;	NEONATE, <12 H	to 11 D	MOR *	<1,400	210212	91	
	Daphnia magna; Water flea;		to 11 D	REP *	11,000	210212	91	
	Daphnia magna; Water flea;		to 11 D	REP *	11,000	210212	91	
	Daphnia magna; Water flea;	NEONATE, <12 H	to 11 D	REP *	9,500	210212	91	
	Daphnia magna; Water flea;	NR	24 H	BCF	1.01	212480	75	
	Daphnia magna; Water flea;	N.Y.	24 H	$^{\circ}$ EC $^{\circ}$	74	210707	82	
	Daphnia magna; Water flea;	NK ::	74 H	EC. 100	987	70/017	87	
	Daphnia magna; Water ilea;	N.Y.	24 H	ECSO ECSO	C61	210/0/	82	
	Daphnia magna; Water Ilea;	NK	24 H	HC.SolM	005,4	315520	8 6	
	Gambusia alimis; Mosquitofish	NR V	H #2	EG.	1.01	212460	0 3	
	Lepomis macrochirus; Bluegill;	3.8-6.4 CM, 1-2G	H 47	LC50	24,000	210128	8 ;	
	Lepomis macrochirus; Bluegill;	3.8-6.4 CM, 1-2G	48 H	Γ_{S0}	24,000	210728	99	
	Lepomis macrochirus; Bluegill;	3.8-6.4 CM, 1-2G	H 96	Γ_{50}^{c}	24,000	210728	99	
	Lepomis macrochirus; Bluegill;	JUVENILE, 0.32-1.2G	24 H	LC ₅₀	17,000	215590	81	
	Lepomis macrochirus; Bluegill;	JUVENILE, 0.32-1.2G	H 96	LC50	16,000	215590	81	
	Lepomis macrochirus; Bluegill;	JUVENILE, 3.65 CM, 0.90 G	1.1	ΓC_{50}	12,000	217398	82	
-	Lepomis macrochirus; Bluegill;	JUVENILE, 3.65 CM, 0.90 G	16 H	LC50	000'9	217398	82	
	Lepomis macrochirus; Bluegill;	JUVENILE, 3.65 CM, 0.90 G	2 H	L_{50}	008'9	217398	82	
	Lepomis macrochirus; Bluegill;	JUVENILE, 3.65 CM, 0.90 G	24 H	$\frac{LC_{50}}{2}$	4,500	217398	82	
	Lepomis macrochirus; Bluegill;	JUVENILE, 3.65 CM, 0.90 G	24 H	ΓC_{50}	000*9	217398	- 88	

Table 0.1–9 AQUIRE Freshwater Toxicity Information (μ g/L) AOC 57

Remedial Investigation Report

Number Pul				-		Effect	**	AOTHRE	TEAT
Legionia mercachiner, Blaegill, TUVERILE, 18.0 CAG, 0.000 21 21 21 21 21 21 21	nical Name	Species	Age	Exposure	Effect	Concent	ration	Reference	jo Jo
TOWENIER 345 COL 000			-6-			Lethal	Sublethal	Number	Publication
JUMERILE, SASCAM, 0090G		Lepomis macrochirus; Bluegill;	JUVENILE, 3.65 CM, 0.90 G	24 H	Γ_{50}^{C}	8,000		85	
TUMPRILE 3.65 CM, 0.000		Lepomis macrochirus; Biuegili;	JUVENILE, 3.65 CM, 0.90 G	4 H	LC50	000,0		82	
JUMENIES, SACKA, 00000		Lepomis macrochirus; Bluegill;	JUVENILE, 3.65 CM, 0.90 G	48 H	L_{50}	4.500		85	
TUVENILE, 3.65 CM, 0.00G 72H LC _G 4.00 217398		Lepomis macrochirus; Bluegill;	JUVENILE, 3.65 CM, 0.90 G	48 H	LC_{50}	7,700			
IUVENILLE, 3.65 CAL, 0.00G		Lepomis macrochirus; Bluegill;	JUVENILE, 3.65 CM, 0.90 G	72 H	LC_{50}	4,500		85	
IUVENILLE, 3.65 CM, 0.00G		Lepomis macrochirus; Bluegill;	JUVENILE, 3.65 CM, 0.90 G	72 H	LCs	7,400		85	
TUVENILLE, 3.65 CM, 0.00G 96 H LC ₀ 7.00 217798		Lepomis macrochirus; Bluegill;	JUVENILE, 3.65 CM, 0.90 G	8 H	LCS	000'9	217398	85	
December		Lepomis macrochirus; Bluegill;	JUVENILE, 3.65 CM, 0.90 G	H 96	LCs	4.500	217398	85	
BGG BGG		Lepomis macrochirus; Bluegill;	JUVENILE, 3.65 CM, 0.90 G	H 96	LC	7,400	217398	85	
BCG		Micropterus salmoides: Largemouth bass	BGG	6.5 D	FC	50	210538	79	
BGG 60 H LCG 60 G 2038 was BGG 60 H LCG 60 G 2038 was BGGS+4D POST HATCH 7.5 D LCG 60 G 20083 was BGGS+4D POST HATCH 7.5 D LCG 90 C 20083 was BGGS+4D POST HATCH 8.4 H LCG 90 C 20083 NR BGGS+4D POST HATCH 8.4 H LCG 90 C 20083 200-400 G 30 D BCR 101 212460 21063 200-400 G 30 D BCR 2.00 31547 200-400 G 30 D HENZ 2.00 31547 200-400 G 30 D HENZ 2.00 31547 200-400 G 30 D HENZ 2.00 31547 200-400 G 30 D HENZ 2.00 31547 200-400 G 30 D HENZ 2.00 31547 200-400 G 30 D HENZ 2.00 31547 <tr< td=""><td></td><td>Microplenis salmoides: Larvemouth bass</td><td>FGG</td><td>0.50</td><td></td><td>09</td><td>210538</td><td>70</td><td></td></tr<>		Microplenis salmoides: Larvemouth bass	FGG	0.50		09	210538	70	
BCGS		Microntents salmoides: Laroemouth hass	RGG	H 09		Oyy	210538	•	
### BGGS-4D POST HATCH 7.5D LC ₂ 0, 7.0 210038 #### BGGS-4D POST HATCH 7.5D LC ₂ 0, 7.0 210038 #### BGGS-4D POST HATCH 7.5D LC ₂ 0, 340 210038 #### BGGS-4D POST HATCH 84H LC ₂ 0, 340 210038 ### BGGS-4D POST HATCH 84H LC ₂ 0, 340 210038 ### BGGS-4D POST HATCH 84H LC ₂ 0, 340 210038 ### BGGS-4D POST HATCH 84H BGRZ 2100 310547 ### BGGS-4D POST HATCH 84H BGRZ 2100 315457 ### BGGS-4D POST HATCH 84H BGRZ 2100 315457 ### BGGS-4D POST HATCH 10 D BGRZ 2100 315457 ### BGGS-4D		Missourems samoides, Lengthnoun bass	007	11 00	1,50	000	210338		
### BGOS=-D POST HATCH 7:5D LC ₁₀ 00 210833 ### BGOS=-D POST HATCH 7:5D LC ₁₀ 00 210833 ### BGOS=-D POST HATCH 7:5D LC ₁₀ 00 210833 ### BGOS=-D POST HATCH 84H LC ₁₀ 00 210833 ### BGOS=-D POST HATCH 84H LC ₁₀ 00 210833 ### BGOS=-D POST HATCH 84H LC ₁₀ 00 210833 ### BGOS=-D POST HATCH 84H LC ₁₀ 00 210833 ### BGOS=-D POST HATCH 84H LC ₁₀ 00 210833 ### BGOS=-D POST HATCH 84H LC ₁₀ 00 210833 ### BGOS=-D POST HATCH 84H LC ₁₀ 00 210833 ### BGOS=-D POST HATCH 10 10 115467 ### BGOS=-D POST HATCH 10 115467 ### BGOS=-D POST HATC		Micropielus salinolues, Laigemouth oass	DOG OF THE SOUTH	4 6 6	٠ 1	01/	21030	2 6	
Name EGGS-4D POST HATCH Λ.5 D LC ₀ 90 21083 Name EGGS-4D POST HATCH 4.3 H LC ₀ 340 21083 NR MR HEM LC ₀ 30 21083 NR 200-400G 30 D ERZ 2.100 315457 200-400G 30 D ERZ 2.100 315457 200-400G 30 D CRR0 2.100 315457 200-400G 30 D CRR0 2.100 315457 200-400G 30 D CRR0 2.100 315457 200-400G 30 D CRR0 2.100 315457 200-400G 30 D CRR0 2.100 315457 200-400G 30 D CRR0 3.1457 315457 200-400G 30 D CRR0 3.15457 315457 200-400G 30 D CRR0 3.15457 315457 200-400G 30 D CRR0 3.15457 315457 20 Colo-400G		Microplerus salmoides, Largemouin pass	EGGS-4D FOST HATCH	מני,	. 0571 	DC ;	50C017		
MR EGGS - 4D POST HATCH 84 H LC₀₀ 340 210533 MR BGGS - 4D POST HATCH 84 H LC₀₀ 340 210533 MR BGGS - 4D POST HATCH 48 H LC₀₀ 300 210533 200 - 400G 30D BMZ * 2,200 315457 200 - 400G 30D BMZ * 2,200 315457 200 - 400G 30D BMZ * 2,000 315457 200 - 400G 30D HEM * 2,000 315457 200 - 400G 30D HEM * 2,000 315457 30D - 400G 30D HEM * 2,000 315457 400 - 400G 30D HEM * 2,000 315457 175-200G 30D HEM * 2,000 315457 175-200G 30D HEM * 2,000 315457 175-200G 30D HEM * 2,000 315457 175-200G 30D HEM * Cc₀ 4,000 315457		Micropterus salmoides; Largemouth bass	EGGS-4D POST HATCH	7.5 D	rc30	09	210563		
MR LCg, state 300 210563 NR MR EGP (2.0) 31057 21069 31057 21069 31057 21069 31057 31		Micropterus salmoides; Largemouth bass	EGGS-4D POST HATCH	84 H	Γ_{50}^{\bullet}	340	210563		
NN		Micropterus salmoides; Largemouth bass	EGGS-4D POST HATCH	84 H	rc ³⁰	390	210563	42	
200−400G 20		Oedogonium cardiacum; Green algae	NR	48 H	BCF	1.01	212480	75	
200−400G 20		Oncorhynchus mykiss; Rainbow trout	200-400 G	30 D	ENZ •	2,100		82	
200−400G 20		Oncorhynchus mykiss; Rainbow trout	200-400 G	30 D	ENZ •	2,900		82	
200−400G 200−400G 200−400G 200−400G 200−400G 200−400G 200−400G 200−400G 200−400G 200−400G 200−400G 20−40G 20		Oncorhynchus mykiss; Rainbow trout	200-400 G	30 D	GRO *	2,100			
200−400G 75−200G 75−200G 75−200G 75−200G 75−200G 75−200G 75−200G 75−200G 75−200G 75−200G 75−200G 75−200G 75−200G 75−200G 75−200G 80		Oncorhynchus mykiss: Rainbow trout	200-400 G	30 D	HEM *	2,100			
75-200 72-200 72 H HEM* 9.8 915457 75-200 75		Oncorhynchus mykiss: Rainbow trout	200-400 G	30 D	MOR *	2.900			
75-200		Oncorhynchus mykiss: Rainbow trout	75-200 G	72 H	HEM *	8.6	315457		
BCGS-4D POST HATCH 16D LC30 <90 210x63 BCGS-4D POST HATCH 16D LC30 <90 210x63 NR NR 48 H LC30 4,100 31x52 NR NR 48 H LC30 4,100 31x52 NR 38 - 64 CM, 1-2 G 24 H LC30 (3c) 2,102 310x88 NW 38 - 64 CM, 1-2 G 24 H LC30 32,130 210728 NW 38 - 64 CM, 1-2 G 24 H LC30 33,390 210728 NW 38 - 64 CM, 1-2 G 48 H LC30 33,390 210728 NW 38 - 64 CM, 1-2 G 48 H LC30 33,390 210728 NW 38 - 64 CM, 1-2 G 48 H LC30 33,390 210728 NW 38 - 64 CM, 1-2 G 48 H LC30 33,390 210728 NW 38 - 64 CM, 1-2 G 48 H LC30 33,390 210728 NW 38 - 64 CM, 1-2 G 96 H LC30		Oncorhynchus mykiss; Rainbow trout	75-200 G	H 96	GRO *	8.6	315457		
BGGS-4D POST HATCH 16D LC ₅ 0 <90 210583		Oncorhynchus mykiss; Rainbow trout	EGGS-4D POST HATCH	16 D	LCen	06>	210563		
NR NR NR NR NR NR NR NR NR NR NR NR NR N		Oncorhynchus mykiss; Rambow trout	BGGS-4D POST HATCH	16 D	LC	<06>	210563	79	
NR NR SIDEMOTH, 1.2−3.8G, 4.6−6.4CM SIDEMOTH, 1.2−3.8G, 4.6−6.4CM SIDEMOTH, 1.2−3.8G, 4.6−6.4CM NR NR NR NR 3.8−6.4 CM, 1−2 G 3.8−6.4 CM, 1−2		Oncorhynchus mykiss; Rambow trout	NR	3 H	ENZ.*	***	216433	80	
NR NR NR NR NR NR NR NR		Oncorhynchus mykiss; Rainbow trout	NR	48 H	LCS	4,100	315526		
STD LENGTH, 1.2 – 3.8 G, 4.6 – 6.4 CM 96 H LC ₅₀ (Cab) 7,460 310688 NR 48 H LC ₅₀ (Cab) 7,460 310688 NR 3.8 – 6.4 CM, 1–2 G 24 H LC ₅₀ 39,130 210728 ww 3.8 – 6.4 CM, 1–2 G 24 H LC ₅₀ 39,130 210728 ww 3.8 – 6.4 CM, 1–2 G 48 H LC ₅₀ 39,130 210728 ww 3.8 – 6.4 CM, 1–2 G 48 H LC ₅₀ 39,130 210728 ww 3.8 – 6.4 CM, 1–2 G 48 H LC ₅₀ 33,930 210728 ww 3.8 – 6.4 CM, 1–2 G 96 H LC ₅₀ 33,930 210728 ww 3.8 – 6.4 CM, 1–2 G 96 H LC ₅₀ 33,930 210728 ww 3.8 – 6.4 CM, 1–2 G 96 H LC ₅₀ 33,930 210728 ww 3.8 – 6.4 CM, 1–2 G 96 H LC ₅₀ 33,930 210728 ww 3.1 J.1 ShM, 0.83 G 96 H LC ₅₀ 33,930 210728 ww		Oncorhynchus mykiss; Rainbow trout	NR	H 96		4,700			
W 3.8—6.4 CM, 1–2 G 24 H C ₅ 1.01 212480 W 3.8—6.4 CM, 1–2 G 24 H LC ₅ 39.39 210728 W 3.8—6.4 CM, 1–2 G 24 H LC ₅ 39.10 210728 W 3.8—6.4 CM, 1–2 G 48 H LC ₅ 39.10 210728 W 3.8—6.4 CM, 1–2 G 48 H LC ₅ 39.39 210728 W 3.8—6.4 CM, 1–2 G 48 H LC ₅ 39.39 210728 W 3.8—6.4 CM, 1–2 G 48 H LC ₅ 33.99 210728 W 3.8—6.4 CM, 1–2 G 96 H LC ₅ 33.99 210728 W 3.8—6.4 CM, 1–2 G 96 H LC ₅ 33.99 210728 W 3.8—6.4 CM, 1–2 G 96 H LC ₅ 33.99 210728 W 3.8—6.4 CM, 1–2 G 96 H LC ₅ 33.99 210728 W 3.8—6.4 CM, 1–2 G 96 H LC ₅ 33.99 210728 W 3.8—6.4 CM, 1–2 G		Oncorhynchus mykiss; Rainbow trout	STD LENGTH, 1.2-3.8G, 4.6-6.4CM	96 H	LC _{en} (Calc)	7,460			
3.8-6.4 CM, 1-2 G 3.8-6.4 CM, 1		Physa sp; Pouch snail;	NR	48 H	BCF	1.01		75	
$3.8-64$ CM, $1-2G$ $24H$ LC_{50} $33,990$ 210728 $3.8-64$ CM, $1-2G$ $24H$ LC_{50} $39,190$ 210728 $3.8-64$ CM, $1-2G$ $48H$ LC_{50} $39,190$ 210728 $3.8-64$ CM, $1-2G$ $48H$ LC_{50} $39,190$ 210728 $3.8-64$ CM, $1-2G$ $48H$ LC_{50} $34,980$ 210728 $3.8-64$ CM, $1-2G$ $96H$ LC_{50} $33,990$ 210728 $3.8-64$ CM, $1-2G$ $96H$ LC_{50} $33,990$ 210728 $3.8-64$ CM, $1-2G$ $96H$ LC_{50} $33,990$ 210728 $3.8-64$ CM, $1-2G$ $96H$ LC_{50} $16,900$ 210728 $3.8-64$ CM, $1-2G$ $96H$ LC_{50} $16,900$ 210728 $3.8-64$ CM, $1-2G$ $96H$ LC_{50} $16,900$ 210728 $3.8-64$ CM, $1-2G$ $96H$ LC_{50} $16,900$ 210728 $3.8-64$ CM, $1-2G$ $39,900$ 210728 310432 $3.8-64$ CM, $1-2G$ $39,900$ 310432 $3.8-64$ C		Pimephales promelas; Fathead minnow	3.8-6.4 CM, 1-2G	24 H	LC	29,120	210728		
$3.8-64$ CM, $1-2G$ $24H$ LC_{50} $39,190$ 210728 $3.8-64$ CM, $1-2G$ $48H$ LC_{50} $29,120$ 210728 $3.8-64$ CM, $1-2G$ $48H$ LC_{50} $33,990$ 210728 $3.8-64$ CM, $1-2G$ $48H$ LC_{50} $34,980$ 210728 $3.8-64$ CM, $1-2G$ $96H$ LC_{50} $34,980$ 210728 $3.8-64$ CM, $1-2G$ $96H$ LC_{50} $34,980$ 210728 $3.8-64$ CM, $1-2G$ $96H$ LC_{50} $33,930$ 210728 $3.8-64$ CM, $1-2G$ $96H$ LC_{50} $33,930$ 210728 $3.8-64$ CM, $1-2G$ $96H$ LC_{50} $16,900$ 210728 $3.8-64$ CM, $1-2G$ $96H$ LC_{50} $16,900$ 210728 $3.8-64$ CM, $1-10$ SM, $14,9$ MM $96H$ LC_{50} $16,900$ 210220 $3.8-64$ CM, $19-25$ CM, $01-0.2G$ $24H$ $10,100$ $10,100$ 210728 $3.8-64$ CM, $1-0.2G$ $24H$ $10,100$ 210728 210728 $3.8-64$ CM, $3.9-25$ CM, $3.9-0.2G$ $3.9-26$		Pimephales promelas; Fathead minnow	3.8-6.4 CM, 1-2G	24 H	LC	33,930	210728	99	
$3.8-64$ CM, $1-2G$ 48 H LC_{50} $29,120$ 210728 $3.8-64$ CM, $1-2G$ 48 H LC_{50} $33,990$ 210728 $3.8-64$ CM, $1-2G$ 48 H LC_{50} $33,990$ 210728 $3.8-64$ CM, $1-2G$ 96 H LC_{50} $29,120$ 210728 $3.8-64$ CM, $1-2G$ 96 H LC_{50} $33,990$ 210728 $3.8-64$ CM, $1-2G$ 96 H LC_{50} $33,990$ 210728 $3.8-64$ CM, $1-2G$ 96 H LC_{50} $33,990$ 210728 $3.10, 17.8$ MM, $0.00, 1.0.0$ 96 H LC_{50} $10,000$ 213217 FRY, $10-15D$, 11.6 MG, 9.5 MM 96 H LC_{50} $10,000$ 213217 SUB-ADULT, $6.5-94D$, 311 MG, 2.8 MM 96 H LC_{50} $22,200$ 310432 $2-3$ MO $14D$ LC_{50} $10,100$ 21634 6 M, $1.9-2.5$ CM, $0.1-0.2G$ 2.4 H LC_{50} $45,530$ 210728 6 M, $1.9-2.5$ CM, $0.1-0.2G$ 0.4 H 1.6 GM 0.10728 0.10728 0.10728 0.10728 <		Pimephales promelas; Fathead minnow	3.8-6.4 CM, 1-2 G	24 H	LCS	39,190	210728	99	
$3.8-64$ CM, $1-2G$ 48 H LC_{50} 33.930 210728 $3.8-64$ CM, $1-2G$ 48 H LC_{50} 34.980 210728 $3.8-64$ CM, $1-2G$ 96 H LC_{50} 34.980 210728 $3.8-64$ CM, $1-2G$ 96 H LC_{50} 33.930 210728 $3.8-64$ CM, $1-2G$ 96 H LC_{50} 33.930 210728 $3.8-64$ CM, $1-2G$ 96 H LC_{50} 33.930 210728 $3.8-64$ CM, $1-2G$ 96 H LC_{50} 33.930 210728 $3.8-64$ CM, $1-2G$ 96 H LC_{50} 33.930 210728 $3.8-64$ CM, $1-12G$ 96 H LC_{50} 16.900 213217 1.8 SMM, 1.8 MM,		Pimephales promelas; Fathead minnow	3.8-6.4 CM, 1-2G	48 H	LC	29,120	210728	99	
3.8-6.4 CM, 1-2G 3.8-6.		Pimephales promelas; Fathead minnow	3.8-6.4 CM, 1-2 G	48 H	LCO	33,930	210728		
$\begin{array}{cccccccccccccccccccccccccccccccccccc$		Pimephales promelas; Fathead minnow	3.8-6.4 CM, 1-2G	48 H	IC	34,980	210728		
$\begin{array}{cccccccccccccccccccccccccccccccccccc$		Pimephales promelas; Fathead minnow	3.8-6.4 CM, 1-2G	H 96	LCJ	29,120	210728	99	
3.8 - 6.4 CM, 1 - 2G 3.8 - 6.4 CM, 1 - 2G 3.10.728 3.10, 77.8 MM, 0.083G FRY, 10 - 15 D, 11.6 MG, 9.5 MM FRY, 10 - 15 D, 11.6 MG, 9.5 MM FRY, 10 - 15 D, 11.6 MG, 9.5 MM FRY, 10 - 15 D, 11.6 MG, 9.5 MM FRY, 10 - 15 D, 11.6 MG, 9.5 MM FRY, 10 - 15 D, 11.6 MG, 9.5 MM FRY, 10 - 15 D, 11.6 MG, 9.5 MM FRY, 10 - 15 CM, 10 - 10.5 MG, 14.9 MM FRY, 10 - 10.5 MG, 14.9 MG, 14.9 MG, 14.9 MG FRY, 10 - 10.5 MG, 14.9 MG,		Pimephales promelas; Fathead minnow	3.8-6.4 CM, 1-2G	H 96	LCS	33,930	210728		
31D, 17.8 MM, 0.083 G 96 H LC ₅₀ 16,900 213217 FRY, 10–15 D, 11.6 MG, 9.5 MM 96 H LC ₅₀ 1C ₅₀ 22,300 310432 310432 JUVENILE, 30–35 D, 76.8 MG, 14.9 MM 96 H LC ₅₀ 22,300 310432 2-3 M 96 H LC ₅₀ 22,300 310432 310432 2-3 M 96 H LC ₅₀ 22,200 310432 2-3 M 96 H LC ₅₀ 22,00 310432 310432 3-3 M 96 H LC ₅₀ 18,100 21,002 21,003 21,0728 6 M, 19–25 CM, 0.1–0.2 G 96 H 16,500 21,0728 97,778		Pimephales promelas; Fathead minnow	3.8-6.4 CM, 1-2G	H 96	LC	33,930	210728	99	
FRY, 10–15 D, 116 MG, 9,5 MM 96 H LC ₅₀ 22,300 310432 JUVENILE, 30–35 D, 76.8 MG, 14.9 MM 96 H LC ₅₀ 35,400 310432 SUB-ADULT, 65–94 D, 391 MG, 28 MM 96 H LC ₅₀ 22,200 310432 2–3 MO 14D LC ₅₀ (Cab) 19,100 216354 6 M, 19–25 CM, 0,1–0.2 G 24 H LC ₅₀ 45,530 210728 6 M, 19–25 CM, 0,1–0.2 G 96 H LC ₅₀ 45,530 210728		Pimephales promelas; Fathead minnow	31 D, 17.8 MM, 0.083 G	H 96	LCS	16,900	213217		
JUVENILE, 30–35 D, 76.8 MG, 14.9 MM 96 H LC50 35,400 310432 SUB-ADUIT, 65–94 D, 391 MG, 28 MM 96 H LC50 22,200 310432 2-3 MO 14 D LC50 (Cab.) 19,100 216354 6 M, 19–25 CM, 0.1–0.2 G 24 H LC50 45,530 210728 6 M, 19–25 CM, 0.1–0.2 G 96 H 1 C50 45,530 210728 6 M, 19–25 CM, 0.1–0.2 G 96 H 1 C50 45,530 210728		Pimephales promelas; Fathead minnow	FRY, 10-15 D, 11.6 MG, 9.5 MM	H 96	ΓC_0	22,300	310432	83	
SUB-ADULT, 65-94 D, 391 MG, 28 MM 96 H LC ₅₀ 22.200 310432 2-3 MO 14D LC ₅₀ (Cab) 19.100 216354 6 M, 1.9-2.5 CM, 0.1-0.2 G 24 H LC ₅₀ 45.530 210728 6 M, 1.9-2.5 CM, 0.1-0.2 G 48 H LC ₅₀ 45.530 210728 6 M, 1.9-2.5 CM, 0.1-0.2 G 6 H LC ₅₀ 45.530 210728		Pimephales promelas; Fathead minnow	JUVENILE, 30-35 D, 76.8 MG, 14.9 MM	H 96	LC	35,400	310432	83	
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$		Pimephales promelas; Fathead minnow	SUB-ADULT, 65-94 D, 391 MG, 28 MM	H 96	LC	22,200	310432	83	
6 M, 1.9 – 2.5 CM, 0.1 – 0.2 G 24 H C.50 45,530 210728 6 M, 1.9 – 2.5 CM, 0.1 – 0.2 G 48 H L.C.50 45,530 210728 6 M, 1.9 – 2.5 CM 0.1 – 0.2 G 96 H L.C.50 45,530 210728		Poecilia reticulata; Guppy;	2-3 MO	14D	LCso (Cab)	19,100	216354	81	
6 M, 1,9-25 CM, 0,1-0.2 G 48 H LC,50 45,530 210728 6 M, 1,9-25 CM 0,1-0.2 G 96 H I C.		Poecilia reticulata; Guppy;	6 M, 1.9-2.5 CM, 0.1-0.2 G	24 H	LCS	45,530	210728		
6M 19-25 CM 01-02 G 96 H I C 30 210728		Poecilia reticulata; Guppy;	6 M. 1.9-2.5 CM. 0.1-0.2 G	48 H		45.530	210728		
		Poecilia reticulata: Gunny:	6M 19-25CM 01-02G	H 96	251	45 530	807.01.0	8 8	



Carassius auratus; Goldfish;

420,000

 LC_{50}

24 H

N.

57AQUTOX.wk1

Table O.1–9 AQUIRE Freshwater Toxicity Information (μg/L) AOC 57

		Devens, Massachusetts	tts					
			-	354	Effect		AQUIRE	Year
Chemical Name	Species	Age	Exposure	Pilect	Lethal	Sublethal	Number	Publication
	77.	24 H	24 H	LÇ	2,270,000		215718	11
	Daphnia magna; Water flea;	6-24H	24 H	EC, IM		1,959,000	210846	88
	Dapinia magia, water ma,	6-24 H	48 H	EC. IM		1,682,000	210846	89
	Darbnia magna, water flea.	<24 H	24 H	LC30	310,000		215184	80
	Daphnia magna, water flee.	<24 H	48 H	LC30	220,000		215184	80
	Darbnia magna; Water flea:	<24 H	48 H	MOR *	000,89		215184	80
	Darbnia magna: Water flea:	N. N.	24 H	EC ₀		1.707	210707	82
	Doubuis mamo Water flea.	NR	24 H	EC100		2.5	210707	82
	Daplinia magna, water flea.	i Z	24 H	EC50		2.1	210707	82
	Lapinna magna, water men,	JUVENILE, 0.32-1.2G	24 H	LC50	230,000		215590	81
	Topomis macrowhims, Diverin,	IIVENITE, 0.32-1.2G	H 96	LCs	220,000		215590	81
	Deponies inactioninas, Diacetus,	NB	24 H	LC	1,100,000		312497	86
	Orygias Jaupes, included, mign—eyes	a z	24 H	ĽĊ	1,100,000		312497	98
	Orygias latipes, Medaka, nign—eyes	4 N	24 H	rc,	840,000		312497	98
	Oryzias latipes; Medaka, hign – eyes	N. N. N. N. N. N. N. N. N. N. N. N. N. N	1 1 8 7 T	06-1 1.Cr	1.100,000		312497	98
	Oryzias latipes; Medaka, high – eyes	N. N. N. N. N. N. N. N. N. N. N. N. N. N	17 C+	06-1	1.100.000		312497	86
	Oryzias latipes; Medaka, high – eyes	N. N.	17 CT 17 CT	001 101	840,000		312497	86
	Oryzias latipes; Medaka, high – eyes	101G 40 03 03	14 C	EC. IM		112,800	210973	78
	Pimephales promelas; Fathead minnow	1.04 G, 49.0 MM	H 70	1	268.000		210973	78
	Pimephales promelas; Kathead minnow	1.04 G, 49.0 IMINI	78 17	EC. IM		00000	210973	78
	Pimephales promelas; Fathead minnow	1.04 G, 49.0 MM	T 04	302	265 000		210973	78
	Pimephales promelas; Fathead minnow	1.04 G, 49.0 MM	4 6	05) T CE		00 00	210073	78
	Pimephales promelas; Fathead minnow	1.04 G, 49.0 MM	H7/	1050a	223 400	200	210073	3,2
Methylene chloride (cont.)	Pimephales promelas; Fathead minnow	1.04 G, 49.0 MM	H7/	1,50	004,464	000	210073	× 4,
	Pimephales promelas; Fathead minnow	1.04 G, 49.0 MM	H 06	M1105.707	102 000	20,00	210073	\$ K
	Pimephales promelas; Fathead minnow	1.04 G, 49.0 MM	H 96	850	310,000		210973	2,82
	Pimephales promelas; Fathead minnow	1.04 G, 49.0 MM	H 06	1 23	330,000		312858	98
	Pimephales promelas; Fathead minnow	30 D, 17.6 MM, 0.000 G	H 55	* CBO	00000	142,000	312567	87
	Pimephales promelas; Fathead minnow	< 24 H, EMBRYO	7 67	OND		82.500	312567	87
	Pimephales promelas; Fathead minnow	< 24 H, EMBRYO	U 87	Oro	474 000	0000	312567	8 2
	Pimephales promelas; Fathead minnow	JUVENILE	192 H		47,1000		312567	8 2
	Pimephales promelas; Fathead minnow	JUVENILE	H 95	\$\frac{1}{2}\text{0}{2}	302,000		216354) &
	Poecilia reticulata; Guppy	2-3 MO	14 D	LC ₅₀ (CaE)	294,000		40007	70
	Darbeit mamo: Woter flee	2 X	24 H	BC		147,000		82
l etrachloroemylene	Daphnia magna, water fica	FIRST INSTAR, < 24 H	48 H	EC501MM		7,500		83
	Danhnia magna: Water flea	<24 H	24 H	LCso	18,000			80
	Darbhia magna: Water flea	FIRST INSTAR, <= 24 H	48 H	EC ₅₀ IMM		7,490		83
	Danhnia magna: Water flea	FIRST INSTAR, $ <= 24 \text{ H} $	48 H	LC ₅₀	060'6			83
	Daphnia magna: Water flea	NR	24 H	EC_0	:	65,000		82
	Daphnia magna: Water flea	FIRST INSTAR, $ <= 24 \text{ H} $	48 H	LC50	18,100	;		£8 :
	Daphnia magna; Water flea	NR	24 H	EC_{100}		250,000		282
	Daphnia magna; Water flea	FIRST INSTAR, $ <= 24 \text{ H} $	48 H	EC ₅₀ IMM		8,500		63
	Daphnia magna; Water flea	FIRST INSTAR, < 24 H	28 D	GRO	:	1,100		88
	Daphnia magna; Water flea	<24 H	48 H	LCso	18,000	640		3 8
	Daphnia magna; Water flea	FIRST INSTAR, < 24 H	28 D	GRO		010		60
	Daphnia magna; Water flea	<24 H	48 H	MOR	10,000	7		S 2
	Daphnia magna; Water flea	< 24 H	28 D	GRO	18 000	1,110		63
	Daphnia magna; Water flea	FIRST INSTAR, < 24 H	48 t	PRP PRP	10,000	\$10		83 83
	Daphnia magna; Water flea	FIRST INSTAR, < 24 H	787 C 86	REP		1.110		83
	Daphnia magna; Water flea	C 24 H HIDST INSTAB < 24 H	28 H	LC	9,100			83
	Dapinia magna; water nea	TIME WITHOUT TOWN		P.				

Table O.1–9 AQUIRE Freshwater Toxicity Information (µg/L) AOC 57

Remedial Investigation Report Devens. Massachusetts

Part Perrine Part	Age Etypoute Effect Concentration Reference State Reference State St	Property Property
SEGNAM Lichal Studiesial Number Rublication FE. 032—1.2G 24 H E.C., MM 1,100 1,100 1,100 FE. 032—1.2G 34 H 1,000 1,100 1,100 1,100 FE. 032—1.2G 36 H 1,000 1,100 1,100 1,100 FE. 032—1.2G 36 H 1,000 1,100 1,100 1,100 J.C. FINCHERLING 24 H 1,000 1,100 1,100 1,100 J.C. FINCHERLING 34 H 1,000 1,100 1,100 1,100 J.C. FINCHERLING 34 H 1,000 1,100 1,100 1,100 SSGC FINCHERLING 48 H 1,000 1,100 1,400 1,400 1,400 SSGC FINCHERLING 48 H 1,000 1,300 1,440 1,440 1,440 SSGC FINCHERLING 54 H 1,000 1,300 1,440 1,440 1,440 SSGC FINCHERLING 54 H 1,000 1,340 1,440 1,440 1	SSC_RNR_ < 24H	STARR < 24H
SEG_HMM EC,0M	Sec. Processer, Sec. Process	Second Second
The control of the	SECTION SECT	Sec Progression State
15.032-1.2G	LE 0.23-1.2G	LE, 0.23—1.2
15.03	1800 1800	1800 1800
1,000, 1	Sec Fingle Relation	SAG FINGERLING
2.5. PROFERLING 2.4 H LC ₀ 4,930 2.5. PROFERLING 2.4 H LC ₀ 4,930 2.5. PROFERLING 2.4 H LC ₀ 4,930 2.5. PROFERLING 2.4 H LC ₀ 4,930 2.5. PROFERLING 2.4 H LC ₀ 5,840 2.5. PROFERLING 2.4 H LC ₀ 5,840 2.5. PROFERLING 2.4 H LC ₀ 5,840 2.5. PROFERLING 2.4 H LC ₀ 5,840 2.5. PROFERLING 2.4 H LC ₀ 5,840 2.5. PROFERLING 2.4 H LC ₀ 1,850 2.5. PROFERLING 2.5 PROFE 2.5 PROFERLING 2.5 PROFERLING 2.5 PROFERLING 2.5 PROFERLING 2.5 PROFERLING 2.5 PROFERLING 2.5 PROFERLING 2.5 PROFERLING 2.5 PROFERLING 2.5 PROFERLING 2.5 PROFERLING 2.5 PROFERLING 2.5 PROFER	2.05. FIGURE LING 2.4 H	2.5.6. FINGERLING 2.4 H
Color Colo	1.00	1.00
1,20, Fine Grant Line 1,20, 1,20	17.0 17.0	1,000, 1
See Chickelling	150 150	150 150
886 C, FROCRELLING 75 H LC, 6 5.810 886 C, FROCRELLING 75 H LC, 6 5.950 80 MM	150 150	150 150
SAGO_RINCERLING 48 H	Sec FNCBRLING	Sec of Fincerly
1.00	1.00 1.00	1.00 1.00
3.60 3.61 1.54,0 4.990 1.500	3.00	3.6
9.00 MM 9.01	9.0 MM 9.0 MM 9.0 MM 1.2 J. J. J. J. J. J. J. J. J. J. J. J. J.	9.0 MM 9.0 MM 9.0 MM 1. LC ₁ 0 1.0 1.0 0. 2. 1.0 0. 3. 0. 0. 0. 0. 0. 0. 4. H LC ₂ 0 1.5 0. 1. 0. 0. 0. 0. 0. 4. H LC ₂ 0 1.5 0. 1. 0. 0. 0. 0. 0. 4. H LC ₂ 0 1.5 0. 1. 0. 0. 0. 0. 4. H LC ₂ 0 1.5 0. 4. O. MM 4. H LC ₂ 0 1.5 0. 2. H LC ₂ 0 1.5 0. 3. O. MM 2. H LC ₂ 0 1.5 0. 3. O. MM 2. H LC ₂ 0 1.5 0. 4. O. MM 2. H LC ₂ 0 1.5 0. 3. O. MM 2. H LC ₂ 0 1.5 0. 4. O. MM 2. H LC ₂ 0 1.5 0. 4. O. MM 3. O
90.0MM	90.0MM 48 H LC ₂ 0 13.000 14.000 15.000 15.000 15.000 15.000 15.000M 48 H LC ₂ 0 15.000 15.000 14.000 15.000M 48 H LC ₂ 0 15.000 15.000M 48 H LC ₂ 0 15.000 15.000 14.000 14.000M 48 H LC ₂ 0 15.000 15.000 15.000M 59 H LC ₂ 0 15.000 15.000 15.000M 59 H LC ₂ 0 15.000 15.000 15.000M 59 H LC ₂ 0 15.000 15.000 15.000M 59 H LC ₂ 0 15.000 15.000 15.000M 59 H LC ₂ 0 15.000 15.000 15.000 15.000M 59 H LC ₂ 0 15.0000 15.000 15.000 15.000 15.000 15.000 15.000 15.000 15.000 15.0000 15.0000 15.0000 15.0000 15.0000 15.0000 15.0000 15.0000 15.00000 15.00000 15.0000 15.0000 15.0000 15.0000 15.0000 15.00000 15.0000 15.	49.0 MM 48.4 LC ₁₀ 49.0 MM 48.4 LC ₁₀ 49.0 MM 48.4 LC ₁₀ 49.0 MM 48.4 LC ₂₀ 48.4 LC ₂₀ 48.4 LC ₂₀ 48.4 LC ₂₀ 48.4 LC ₂₀ 48.4 LC ₂₀ 48.4 LC ₂₀ 48.4 LC ₂₀ 48.4 LC ₂₀ 48.4 LC ₂₀ 48.4 LC ₂₀ 48.4 LC ₂₀ 48.4 LC ₂₀ 48.4 LC ₂₀ 48.4 LC ₂₀ 49.0 MM 48.4 LC ₂₀ 49.0 MM 58.4 LC ₂₀ 49.0 MM 58.4 LC ₂₀ 58.4 LC ₂₀ 58.4 LC ₂₀ 58.4 LC ₂₀ 58.4 LC ₂₀ 58.4 LC ₂₀ 58.4 LC ₂₀ 58.4 LC ₂₀ 58.4 LC ₂₀ 58.4 LC ₂₀ 58.4 LC ₂₀ 58.4 LC ₂₀ 58.4 LC ₂₀ 58.4 LC ₂₀ 58.4 LC ₂₀ 58.4 LC ₂₀ 58.4 LC ₂₀ 59.5 LC ₂₀
90 MM 49	9.0 MM 4.8 H 1. C _C ₀ 11.500 40.0 MM	9.0 MM 4.8 H 1. C _{C₁} 11.5 MM 4.8 H 4.6 H 4.6 MM 4.8 H 4.8 H 4.6 MM 4.8 H 4.8 H 4.6 MM 4.8 H 4.8 H 4.6 MM 4.8 H 4.8 H 4.6 MM 4.8 H 4.8 H 4.6 MM 4.8 H 4.6 MM 4.8 H 4.6 MM 4.8 H 4.6 MM 4.8 H 4.6 MM 4.8 H 4.6 MM 4.8 MM 4.8 H 4.8
## 15.00 #### 15.00 #### 15.00 #### 15.00 #### 15.00 #### 15.00 #### 15.00 #### 15.00 #### 15.00 ###################################	9.00 MM 9.01 LC _{2,0} 13.500 9.01 LC _{2,0} 19.600 9.02 LC _{2,0} 19.600 9.03 LC _{2,0} 19.600 9.04 LC _{2,0} 20.300 9.04 LC _{2,0} 20.300 9.05 LC _{2,0} 13.400 9.05 LC _{2,0} 13.400 9.00 MM 9.00	96.00 MM 96.00
90.0MM 48 H EC ₉₀ IMM 48 H EC ₉₀ IMM 48 H EC ₉₀ IMM 48 H EC ₉₀ IMM 48 H EC ₉₀ IMM 48 H EC ₉₀ IMM 48 H EC ₉₀ IMM 48 H EC ₉₀ IMM 48 H EC ₉₀ IMM 49 H EC ₉₀ IMM 49 H EC ₉₀ IMM 49 H EC ₉₀ IMM 49 H 40.0MM 49 H EC ₉₀ IMM 40 H EC ₉₀ IMM 40	9.0 MM 9.0 M	90.0MM 48 H EC ₅₀ IMM 48 H EC ₅₀ IMM 49 H EC ₅₀ IMM 40 I I I I I I I I I I I I I I I I I I I
(490 MM (48 H	(490 MM) (481 EC ₂ 0 MM) (481 EC ₂ 0 MM) (481 EC ₂ 0 MM) (481 EC ₂ 0 MM) (481 EC ₂ 0 MM) (480 MM) (480 MM) (490	(47) (48) (48) (490 MM (48) (48) (490 MM (48) (48) (48) (48) (48) (48) (48) (48)
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3.5 D 17,000 17,000 17,000 3.5 D 14,000 17,000 17,000 3.5 D 14,000 14,000 14,400 3.5 D 18,400 18,400 18,400 3.0 OR 4TH INSTAR, $20-3.5$ MM 48 H LC_{50} 30,800 3.0 OR 4TH INSTAR, $20-3.5$ MM 24 H LC_{50} 54,600 3.0 OR 4TH INSTAR, $20-3.5$ MM 24 H LC_{50} 30,800 3.0 INSTAR LARVAB 24 H LC_{50} 313,000 215700 1 INSTAR LARVAB 24 H LC_{50} 470,000 215718 1 INSTAR LARVAB 24 H LC_{50} 470,000 215718 1 INSTAR LARVAB 24 H LC_{50} 470,000 215718 1 INSTAR LARVAB 24 H LC_{50} 470,000 215184 1 H 48 H LC_{50} 470,000 215184 24 H 48 H LC_{50} 470,000 215184 24 H 48 H LC_{50} 470,000 215184	$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	$ \begin{array}{cccccccccccccccccccccccccccccccccccc$
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INSTAR LARVAE 24 H EG ₅₀ IM 9,950 21,520 215700 NATE MOR 9,950 21,5700 215700 NATE 24 H EC ₅₀ GR 113,000 215700 NSTAR 48 H EC ₅₀ GR 470,000 215215 INSTAR 24 H LC ₅₀ 470,000 215784 H 48 H MOR 28,000 215184 24 H 48 H MOR 28,000 215184 24 H EC ₅₀ IM 310,000 215184 24 H EC ₅₀ IM 34,000 215184 24 H EC ₅₀ IM 38,000 210847 24 H EC ₅₀ IM 38,000 210847 24 H EC ₅₀ IM 33,000 31000 24 H EC ₅₀ IM 360 21000 24 H EC ₅₀ IM 310,000 313,000 24 H EC ₅₀ IM 310,000 313,000 24 H EC ₅₀ IM 310,000 313,000 24 H <td>$\begin{array}{c ccccccccccccccccccccccccccccccccccc$</td> <td>$\begin{array}{c ccccccccccccccccccccccccccccccccccc$</td>	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$
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H MOSS ASSON 215.00 24H 21D REP 28.00 215.84 24H 24H EC30IM 84.000 215.84 24H EC30IM 84.000 210847 24H EC40 93 210628 24H EC50 93 210707 24H EC50 270 210707 24H EC50 270 210707 24H EC50 84 216628 24H EC50IM 84 216628	48 H MOR 28,000 215184 24 H 24 EC ₅₀ IM EC ₅₀ IM 84,000 210847 24 H EC ₅₀ IM EC ₅₀ IM 84,000 210847 24 H EC ₅₀ IM 84,000 210847 24 H EC ₅₀ IM 84,000 210847 24 H EC ₅₀ IM 84,000 210847 24 H EC ₅₀ IM 84,000 210847 24 H EC ₅₀ IM 7,000 313 year	48 H MOR 28,000 215184 24 H 24 H EC ₅₀ IM REP 7,000 215184 24 H EC ₅₀ IM BC ₅₀ 21,0847 24 H EC ₅₀ IM 84,000 21,0847 24 H EC ₅₀ IM 84,000 21,0847 24 H EC ₅₀ 93 21,0707 24 H EC ₅₀ 7,000 21,0707 24 H EC ₅₀ 84 21,6628 24 H EC ₅₀ 313142
24H EC ₅₀ IM EC ₅₀ IM 84,000 210847 24H EC ₅₀ IM 84,000 210847 24H EC ₆ S ₅₀ IM 84,000 210847 24H EC ₁₀₀ S ₅₀ 210707 24H EC ₅₀ S ₅₀ 210707 24H EC ₅₀ S ₅₀ 210707 24H EC ₅₀ S ₅₀ 210707 24H EC ₅₀ S ₅₀ 210707	24H 27D REP 1,000 210847 24H 24H 24H 24H 24H 24H 24H 24H 24H 24H	24H 21D REP 1,000 210847 24H EC ₅₀ IM EC ₅₀ IM 84,000 210847 24H EC ₅₀ IM 84,000 210847 24H EC ₅ 0IM 84,000 210847 24H EC ₅₀ 93 210707 24H EC ₅₀ 84 210707 24H EC ₅₀ 84 216628 3 3 3 2 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3
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24 H EC ₅₀ IM 7,000 31314	24 H EC ₅₀ IM 7.000 3131A	24 H EC ₅₀ IM 7.000 313125
		10-Mar



Table O.1–9 AQUIRE Freshwater Toxicity Information (μg/L) AOC 57

		Devens, Massachusetts			1 80 %		i dina	
Cheminal	Snavjas	Age	Hynogline	Rffect	Concentration		Reference	rear
Chemicalitanne	estordo.)Gy ,	amcodura		Lethal	Sublethal	Number	Publication
	Diaptomus forbesi; Calanoid copepod; Copepoda;	NR	H 96	LCso	447,000	000	311282	83
	Scenedesmus subspicatus; Green algae; Chlorophyta;	LOG GRO PHASE	48 H	EC ₅₀ BM		135,000	212997	26.6
	Scenedesmus subspicatus; Green algae; Chlorophyta;	LOG GRO FRASE	# ¢	4505JH		000,621	212597	2 8
	Selenastrum capricomutum; Green algae; Cinorophyta;	NR	72 H	ECOGR		12,500	313142	0 80 80
				00				
1,1,2-Trichloroethylene	Aedes aegypti, mosquito	3RD INSTAR	48 H	LC_{50}	48,000			83
	Ambystoma mexicanum, salamander	3-4 WK	48 H	LC_{50}	48,000			80
	Asellus aquaticus, sowbug	NR	48 H	ΓC_{50}	30,000			83
	Brachydanio rerio, zebrafish	NR	48 H	ΓC_{50}	000'09			62
	Chironomus thummi, midge	NR	48 H	LC_{50}	64,000			83
	Cloeon dipterum, mayfly	NR	48 H	LC_{50}	42,000			83
	Corixa punctata, water boatman	NR	48 H	${ m LC}_{50}$	110,000			83
	Culex pipiens, mosquito	3RD INSTAR	48 H	ΓC_{50}	55,000			83
	Daphnia magna, water flea	<=24 H	48 H	LC_{50}	18,000			80
	Daphnia magna, water flea	NR	3D	ABD	25.000			84
	Daphnia magna, water flea	24 H	24 H	LC_{50}	1,000,000			77
	Daphnia magna, water flea	NR	24 H	leth	110,000			84
	Daphnia magna, water flea	NR	24 H	EC_{50}	1,313,000			82
	Daphnia magna, water flea	<=24 H	24 H	Γ_{S_0}	22,000			80
	Daphnia magna, water flea	<=24 H	48 H		2,200			80
	Dugesia lugubris, flatworm	NR	48 H	ΓC_{50}	42,000			83
	Erpobdella octoculata, lecch	NR	48 H	LC50	75,000			83
	Gammarus pulex, scud	NR	48 H	LC_{50}	24,000			83
	Hydra oligactis, hydra	BUDLESS	48 H	LCso	75,000			83
	Hydra oligactis, hydra	NR	48 H	ΓC_{50}	75,000			83
	Ischnura elegans, dragonfly	NR	48 H	ΓC_{50}	49,000			83
	Lepomis macrochirus, bluegill	JUVENILE 75 D, 2.2 CM	1 H	RES	100			06
	Lepomis macrochirus, bluegill	JUVENILE, 0.32-1.2G	H 96	LC30	45,000			81
	Lepomis macrochirus, bluegill	JUVENILE, 0.32-1.2G	24 H	LC ₅₀	68,000 to 100,000			81
	Lymnaea stagnalis, great pond snail	3-4 WK	48 H	LC ₅₀	26,000			83
	Lymnaea stagnalis, great pond snail	NR	48 H	LC30	\$6,000			83
	Moina macrocopa, water flea	SD	3 H	LC ₅₀	2,300			98
	Nemoura cinerea, stonefly	NR	48 H	LC_{50}	70,000			83
	Oncorhynchus mykiss, rainbow trout	NR	24 H	RES	2,000			79
	Oncorhynchus mykiss, rainbow trout	5-8 WK	48 H	LC_{50}	42,000			83
	Oryzias latipes, medaka	3 CM, 0.3 G	48 H	LC_{50}	1,900			86
	Oryzias latipes, medaka	4-5WK	48 H	$^{ m LC}_{50}$	270,000			83
	Pimephales promelas, fathead minnow	1.04 G, 49.0 MM	48 H	IMM	22,700			78
	Pimephales promelas, fathead minnow	31D	H 96	ΓC_{50}	44,100			85
	Pimephales promelas, fathead minnow	30-35D	24 H	$^{ m LC_{50}}$	28,800			83
	Pimephales promelas, fathead minnow	3-4 WK	48 H	ΓC_{50}	47,000			83
	Pimephales promelas, fathead minnow	1.04 G, 49.0 MM	H 96	IMM	21,900			78
	Pimephales promelas, fathead minnow	30-35D	48 H	LC_{50}	57,900			83
		1.04 G, 49.0 MM	72 H	IMM	22,200			78
1,1,2-Trichloroethylene (cont.)		1.04 G, 49.0 MM	24 H	$^{ m LC}_{50}$	52,400			78
	Pimephales promelas, fathead minnow	30-35D	H 96		45,000			83
	Pimephales promelas, fathead minnow	1.04 G, 49.0 MM	24 H	IMM	23,000			78
	Pimephales promelas, tathead minnow	0.12G	7 F	05)1 1	44.100			83
	Pimephales promeias, tathead minnow	30-33 D	H 7/	چ د د د	33.400			83
	Pimephales promelas, tathead minnow	1.04 G; 49.0 MM	11 06	17-20	008.90			٧/

Table O.1–9 AQUIRE Freshwater Toxicity Information (μg/L) AOC 57

		Devens, Massachusetts	-					
ChemicalName	Species	Age	Exposure	Effect	Effect Concentration	ű	AQUIRE Reference	Year
	*		•		Lethal	Sublethal	Number	Publication
	Pimephales promelas, fathead minnow	1.04 G, 49.0 MM	H 96	LC30	40,700			78
	Fillicpliates prometas fathead minnow	1.04 G, 49.0 MM	H 7/	\$ C	53,000			8 %
	Scenedesmis abindans green aloae	10F4 CELL SMI	H 96	80 E	450 000			0/ 8
	Selenastrum capricomutum, green algae	LOG PHASE	H 96	PGR	175.000			8
	Tubificidae, tubificidae	NR	48 H	LCs	132,000			83
	Xenopus laevis, clawed toad	3-4 WK	48 H	ΓC_{50}	45,000			80
PAL Semivolatile Organics								
Bis(2-ethylhexyl)phthalate	Anacystis aeruginosa: Blue – green algae:	LOG PHASE 500000 CELLS/ML	H 96	ECAGR		>=320	215336	81
	Anacystis aeruginosa; Blue – green algae;	LOG - PHASE 500000 CELLS/ML	H 96	PGR •		>=320	215336	81
	Brachydanio rerio; Zebra danio, zebrafish;	4-5 WK	H 96	LCS	>320		215390	84
	Brachydanio rerio; Zebra danio, zebrafish;	4-5 WK	H 96	MOR *	>=320		215390	84
	Brachydanio rerio; Zebra danio, zebrafish;	<4 H, EGGS	5 WK	DVP *		>=1000	215390	84
	Brachydanio rerio; Zebra danio, zebrafish;	1-2D	H 96	MOR *	>=320		215390	84
	Brachydanio rerio; Zebra danio, zebrafish;	<4 H, EGGS	S WK	GRO •		>=1000	215390	84
	Brachydanio rerio; Zebra danio, zebrafish;	1-2D	H 96	BEH *		>=320	215390	84
	Brachydanio rerio; Zebra danio, zebrafish;	4-5 WK	H 96	BEH •		>=320	215390	84
	Brachydanio rerio; Zebra danio, zebrafish;	1-2D	H 96	LC	>320		215390	**
	Brachydanio rerio; Zebra danio, zebrasish;	<4 H, BGGS	5 WK	MOR.	>=1000		215390	84
	Buso woodhousei sowleri; Fowler's toad;	EMBRYO TO LARVA	to 8 D *	$^{ m LC}_{50}$	3,880		216772	78
	Bufo woodhousei fowleri; Fowler's toad;	LARVA	∗ H 96	LC30	3,880		216772	78
	Carassius auratus; Goldfish;	EMBRYO TO LARVA	* H 96	LC3	6,180		216772	78
	Carassius auratus; Goldfish;	EGGS, 4 D POSTHATCH	H 96	LC ₅₀	> 191000		210563	79
	Carassius auratus; Goldfish;	EGGS, 4 D POSTHATCH	H 96	rC ₅₀ *	> 186000		210563	79
	Carassius auratus; Goldfish;	EGGS, 4 D POSTHATCH	8 D	rc20.	> 191000		210563	79
	Carassius auratus; Goldfish;	BGGS, 4 D POSTHATCH	8 D	LC ₅₀	> 186000		210563	79
	Chircnomus plumosus; Midge;	EGG	30 D	HAT.		560	217688	77
	Chironomus plumosus; Midge;	LARVAE	30 D	DVP.		260	217688	11
	Chlorella pyrenoidosa; Green algae;	LOG-PHASE 10000 CELLS/ML	H 96	EC50GR		>320	215336	81
	Chlorella pyrenoidosa; Green algae:	LOG - PHASE 10000 CELL,S/ML	H 96	PGR *		>=320	215336	81
	Daphnia magna; Water flea;	<24 H	24 H	rc ₅₀	>68000		215184	80
	Daphnia magna; Water flea;	NR	21 D	REP.		10	210736	73
	Daphnia magna; Water slea;	< 24 H	21 D	MOR *	10		311061	82
	Daphnia magna; Water slea;	ZZ.	21 D	REP •		2.5	210736	73
	Daphnia magna; Water flea;	< 24 H	21D	MOR *	3.2	•	311061	82
	Daphnia magna; water liea; Danhnia magna: Water flea:	7.7 7.24	717 78 T	KEF.		wţ	210/36	3.3
	Daphnia magna: Water flea:	TI AN	112	REP		÷ 6	210736	73
	Darbnia magna: Water flea:	51D	2.WK	MOR.	33	Or .	215336	2, 2
	Daphnia mama: Water flea:	FIRST INSTAR. < 24 H	7.D	BIO *	1	811	312340	87
	Daphnia magna: Water flea:	FIRST INSTAR, < 24 H	7.0	MOR	158	1	312340	87
	Daphnia magna; Water slea;	<1D	3 W.K	TC	>320		215336	8
	Daphnia magna; Water flea;	FIRST INSTAR, < 24 H	7.D	MOR *	811		312340	87
	Daphnia magna; Water flea;	<24 H	2 WK	REP *		320	215336	81
Bis(2-ethylhexyl)phthalate	Daphnia magna; Water slea;	NR	14 D	REP *		10	210736	73
(cont.)	Daphnia magna; Water flea;	<24 H	48 H	ΓC_{50}	11,000		215184	80
	Daphnia magna; Water flea;	NR	14 D	REP *		က	210736	73
	Daphnia magna; Water ilea;	FIRST INSTAR. < 24 H	21D	MOR *	158	;		87
	Daphnia magna; Water flea;	NK FIDST DISTAN	14 D	REP *		30		73
	Daphnia magna; water ilea;	FIRSI INSTAR, < 24 H	n /	* OIS		138	312340	<i>*</i> ⊗



Table O.1-9 AQUIRE Freshwater Toxicity Information (μg/L) AOC 57

		Devens, Massachusetts					ļ	
Chemical Name	Species	Age	Exposure	Bffect	Effect Concentration	AQU	AQUIRE Reference	Year of
	•	•	•		Lethal Sublethal		_	Publication
	Daphnia magna; Water flea;	< 24 H	21 D	MOR *	100	31	311061	82
	Daphnia magna; Water flea;	<1D	3 WK	MOR *	>=320	21	215336	81
	Daphnia magna; Water flea;	< 24 H	21 D	MOR *	32	31	311061	82
	Daphnia magna; Water flea;	<24 H	48 H	MOR *	1,100	21	215184	80
	Daphnia magna; Water flea;	<1D	2 WK	ΓC_{50}	>320		215336	81
	Daphnia magna; Water flea;	<1D	24 H	EC ₅₀ IM		>320 21	215336	81
	Daphnia magna; Water flea;	FIRST INSTAR, < 24 H	21 D	MOR *	811		312340	87
	Daphnia magna; Water ilea;	ISI INSIAK, 24 H	21.0	KEF		۶ 2.5	210/32	5 5
	Daphnia magna; Water ilea;	<1D	2 W.K	MOR:	>=320		215330	≅ !
	Daphnia pulex; Water flea;	NEONATE, < 24 H	48 H	ECSOIM			312/30	87
	Euglena gracilis, Flagellate euglenoid;	LOG - PHASE 10000 CELLS/ML	H 96	ECSOGR			215336	. œ
	Euglena gracilis; Flagellate euglenoid;	LOG - PHASE 10000 CELLS/ML	H 96	FGR.		>=320 23	215336	. 1 8 1
	Gammarus pseudolimnaeus; Scud;	NR	H 95	, , , ,	>32000	5.5	210/32	7/3
	Gammarus pseudolimnaeus; Scud;	JOVENILE	H 95	S. C. S.	> 32000		210000	⊋ ≀
	Gammarus pulex; Scud;	> 12 MM	1 01	:00:			2100/9	7.7
	Gammarus pulex; Scud;	> 12 MM	10 E	• 30T		2000	2100/9	5 3
	Gasterosteus aculeatus; Three spine stockleback;	4-5 WK	48 H	ş,	300	5 2	210823	68
	Gasterosteus acuteaus; Inree spine strokieback;	4-5 WK	# F	\$. \$.	006	7 6	210823	8
	Gasterosteus acuteams; Infee spine sterkleback;	NW C=+	14 H	17.50		000	210623	8
	Casterosteus acuteams; Infee spine suckretack;	A Sum	22.0	4 20 4	. ,		10023	8
	Casterosteus acuteams; Inree spine stockleback;	4-3 WK	# 7.	1.00	000		210823	66
	Gasterosteus acureams; Inree spine stickleback;	EGGS, < 0.11	35 C	\$\frac{1}{2}.	> 320	7	10823	8 8
	Gasterosteus aculeatus; Ihree spine stickleback;	4-5 WK	H2/.	ئ ئ ئ	> 300		210823	80
	Gasterosteus acuteaus; Inree spine strekteoack;	4 = 5 W.K.	4 6 H F	1020		2000	210823	80
	Casterosteus acuteams; innee spine starkieback;	7 × 5 × 7 × 7 × 7 × 7 × 7 × 7 × 7 × 7 ×	H 7/	# # CO	,		210623	6 6
	Casterosteus atureams, Illies spuis suchicoack,	4 C C C C C C C C C C C C C C C C C C C	# P	100	, 100000		210623	8
	Totalisms amototics Change of cettake	AVOATOT OVOGANG	TT 00	1030	20001	3 6	216772	9 8
	Ictalurus punctaus; Channel caulisn;	SMBKTO TO LAKVA	. H 06	1,50	089	3 6	7//01	8 7
	Jordanelia nortdae, Fiaglish;	26-53 D	Aw c	MOR	V=320	7 6	213330	07
	Jordanella lioridae, Flaglish;	H 062	4 W.K.	MOK :	075 = <	77 6	213330	81
	Jordanella Horidae; Flaglish;	<.50 H	U ,	, i	> 320	7 7	215330	× 5
	Jordanella Hondae; Flaghish;	777 T	H 90	PET *			213330	0 6
	Jordon of Porth of Director	4 - 5 VIV	# P 70	Uag 11	7330	2 025=7	215550	6 6
	Jordanella Horidae, Flagilish, Tordanella floridae, Planfish.	1 C 1 C 1 C 1 C 1 C 1 C 1 C 1 C 1 C 1 C	48 11	8. C	7320	3 6	215330	8
	Jordanalla Hounday, Flaguish,	73/1	7/N/V	\$ CA		220 000	215330	5 5
	Jordanella floridae: Flaofish:	28-35D	4 WK	MOR *	>=320		215336	
	Tordanella floridae Blagfish:	236 H	4 WK	**************************************	>320	7 5	215336	. .
	Jordanella floridae: Flaofish:	4-5 WK	48 H		>320	21	215336	2 5
	Jordanella floridae; Flagfish;	1-2D	96 H	BEH *		>=320 21	215336	81
	Jordanella floridae; Flagfish;	28-35D	4 WK	GRO *	Ä	>=320 21	215336	81
	Jordanella floridae; Flagfish;	28-35D	2 WK	MOR*	>=320	21	215336	81
	Jordanella floridae; Flagfish;	28-35D	4 W.K	REP *		>=320 21	215336	81
	Jordanella floridae; Flagfish;	28-35D	1 WK	MOR *	>=320	21	215336	81
٠	Lepomis macrochirus; Bluegill;	0.32-1.2G, JUVENILE	24 H	ΓC_{50}	>770000	21	215590	81
Bis(2-ethylhexyl)phthalate	Lepomis macrochirus; Bluegill;	0.32-1.2G, JUVENILE	H 96	ΓC_{50}	>770000	21	215590	81
(cont.)	Lepomis macrochirus; Bluegill;	0.6G	H 96	LC ₅₀	> 100000		210666	80
	Lepomis macrochirus; Bluegill;	JUVENILE, 35 - 60 MM	0.7 H	AVO*		112,400 21	215272	80
	Micropterus salmoides; Largemouth bass;	EGGS, 4D POSTHATCH	84 H	LC ₅₀	32,100	5 2	210563	6 ;
	Micropterus salmoides; Largemouth bass; Micropterus salmoides: Largemouth bass:	EMBRIO 10 LARVA EMBRYO TO LARVA	* H 96	\$ 1.01 1.01	32,900 42 100	2 2	27/0172	% %
			1		Ĭ	ì		2

Table 0.1–9 AQUIRE Freshwater Toxicity Information ($\mu g/L$) AOC 57

		Devens, Massachusetts						1
Chemical Name	Species	Age	Exposure	Effect	Effect Concentration	AQUIRE	E Year	
	•	,			Lethal Sublethal	T.	Pub	
	Micropterus salmoides; Largemouth bass;	EGGS, 4D POSTHATCH	7.5 D	LCo	45,500	210563	1	0
	Micropterus salmoides; Largemouth bass;	EGGS, 4 D POSTHATCH	7.5 D	rc,	55,700	210563	63 7	6
	Micropterus salmoides; Largemouth bass;	EGGS, 4 D POSTHATCH	84 H	rc,	65,500	210563		6/
	Oncorhynchus kisutch; Coho salmon, silver salmon;	1.5G	H 96	r) L	> 100000	210666		80
	Oncorhynchus mykiss; Rainbow trout, donaldson trout;	EYED EGGS	12 D •	MOR:	54	217859		9/
	Oncorhynchus mykiss; Rainbow trout, donaldson trout;	EYED EGGS	100 D	HAT *		54 217859	•	92
	Oncorhynchus mykiss; Rainbow trout, donaldson trout;	EYED EGGS	12 D •	MOR *	14	217859	•	9/
	Oncorhynchus mykiss; Rambow trout, donaldson trout;	EGGS, 4D POSTHATCH	23 D	LC30 *	154,000	210563	•	79
	Oncorhynchus mykiss; Rambow trout, donaldson trout;	EYED EGGS	12D *	MOR *	5	217859	•	92
	Oncorhynchus mykiss; Rambow trout, donaldson trout;	EGGS, 4 D POSTHATCH	27 D	ΓC_{50}	149,200	210563	•	6
	Oncorhynchus mykiss; Rainbow trout, donaldson trout;	1.5G	H 96	LC50	> 100000	210666		80
	Oncorhynchus mykiss; Rainbow trout, donaldson trout;	EMBRYO TO LARVA	• H 96	LC	149,200	216772	,	82
	Oncorhynchus mykiss; Rambow trout, donaldson trout;	EYED EGGS	24 D •	MOR .	14	217859	•	9/
	Oncorhynchus mykiss; Rainbow trout, donaldson trout;	EYED EGG	Q 06	VTE •		14 215109		11
	Oncorhynchus mykiss; Rainbow trout, donaldson trout;	EYED EGGS	24 D •	MOR *	ĸ	217859	•	92
	Oncorhynchus mykiss; Rainbow trout, donaldson trout;	EYED EGGS	100 D	GRO *		62 217859		9/
	Oncorhynchus mykiss; Rainbow trout, donaldson trout;	EYED EGGS	24 D *	MOR *	54	217859		9/
	Oncorhynchus mykiss; Rainbow trout, donaldson trout;	EGGS, 4 D POSTHATCH	27 D	rcy,	139,500	210563		6/
	Oncorhynchus mykiss; Rainbow trout, donaldson trout;	EYED EGGS	SD•	MOR .	14	217859	,	9/
	Oncorhynchus mykiss; Rambow trout, donaldson trout;	EYED EGG	00 D	GRO •		54 215109		11
	Oncorhynchus mykiss; Rambow trout, donaldson trout;	EYED EGGS	5D•	MOR.	ĸ	217859	•	92
	Oncorhynchus mykiss; Rainbow trout, donaldson trout;	EGGS, 4 D POSTHATCH	23 D	rc3,	139,100	210563	,	6/
	Oncorhynchus mykiss; Rainbow trout, donaldson trout;	EYED EGG	00D	VTE •		5 215109	,	77
	Oncorhynchus mykiss; Rambow trout, donaldson trout;	EMBRYO TO LARVA	• H 96	LC30	139,500	216772		78
	Oncorhynchus mykiss; Rainbow trout, donaldson trout;	EYED EGGS	5D.	MOR *	54	217859	`	92
	Oryzias latipes; Medaka, high – eyes;	28-35D	4 WK	GRO •	>=320	20 215336		81
	Oryzias latipes; Medaka, high – eyes;	28-35D	4 WK	REP *	>=320			81
	Oryzias latipes; Medaka, high – eyes;	1-2D	H 96	BEH *	>=320			81
	Oryzias latipes; Medaka, high – eyes;	4-5 WK	48 H	LC ₅₀	>320	215336		81
	Oryzias latipes; Medaka, high – eyes;	28-35D	1 WK	MOR *	>=320			81
	Oryzias latipes; Medaka, high – eyes;	4-5 WK	H 96	BEH *	>=320			81
	Oryzias latipes; Medaka, high – eyes;	28-35D	3 WK	MOR *	>=320	215336		81
	Oryzias latipes; Medaka, high – eyes;	4-5 WK	H 96	rc,	>320	215336		81
	Oryzias latipes; Medaka, high – eyes;	28-35 D	4 WK	Γ_{50}^{c}	>320	215336		81
	Oryzias latipes; Medaka, high – eyes;	<30 H	4 WK	ည် လို့ (>320	215336		81
	Organs latipes; Medaka, nign – eyes;	11757	Hon	057 7.	>320	215336		5 5
	Organisations, Medaka high cycs,	1-11 1-1	T 87	J. J.	7=320 -330	213330		5 5
	Orzias latipes: Medaka, high eyes:	28-35D	2 WK	MOR.	> = 320 > = 320	215336		2 2
	Oryzias latipes; Medaka, high – eves;	28-35D	4 WK	MOR *	>=320	215336		. 2
	Oryzias latipes; Medaka, high – eyes;	<36 H	7.D	ΓC_{40}	>320	215336		81
	Pimephales promelas; Fathead minnow;	7.5 MO, 1.24 G	26 D	MOR*	62	217859		9/
	Pimephales promelas; Fathead minnow;	7.5 MO, 1.24 G	S6.D	GRO *		62 217859		92
	Pimephales promelas; Fathead minnow;	FRY, 10 D	127 D	GRO *		100 215109		11
	Pimephales promelas; Fathead minnow;	FRY, 10 D	127 D	VTE *		11 215109		11
Bis(2-ethylhexyl)phthalate	Poecilia reticulata; Guppy;	21-28D	2 WK	LC50	>320	215336		81
(cont.)	Poecilia reticulata; Guppy;	21-28D	48 H	LC	>320	215336		81
	Poecilia reticulata; Guppy;	21-28D	4 WK	LCso	>320	215336		81
	Poecilia reticulata; Guppy;	21-28 D	1 WK	ΓC_{50}	>320	_		81
	Rana arvalis; Moorirog:	EGGS	3 W.K	HAT	0.89 to 187.40	_	•	87
	Rana pipiens; Leopard frog;	EMBRYO TO LARVA	to 8 D *	Γ_{50}	4,440	2167		%



Table O.1–9 AQUIRE Freshwater Toxicity Information (μg/L) AOC 57

		Devens, Massachusetts						
Chemical Name	Snecies	Age	Exposure	Effect	Effect Concentration		AQUIRE Reference	Year
			a monday		Lethal	ublethal	Number	Publication
	Rana pipiens: Leopard frog:	LARVA	*H96	LÇ	4,440		216772	78
	Salvelinus fontinalis: Brook trout:	ADULT, 1.5 YR	150 D	GRO*	•	52	215109	11
	Salvelinus fontinalis; Brook trout;	ADULT, 1.5 YR	150 D	VTE *		3.7	215109	11
	Selenastrum capricornutum: Green algae:	LOG-PHASE 50000 CELLS/ML	H 96	EC. GR		>320	215336	81
	Selenastrum capricornutum; Green algae;	LOG-PHASE 50000 CELLS/ML	H 96	PGR*		>=320	215336	81
	Stephanodiscus hantzschii; Diatom;	LOG-PHASE 10000 CELLS/ML	H 96	BCoGR		>320	215336	81
	Stephanodiscus hantzschii; Diatom;	LOG-PHASE 10000 CELLS/ML	H 96	PGR*		>=320	215336	81
PAL Metals								
Aluminum	Brachionus calyciflorus; Rotifer,	NEONATE	24 H	LC	> 3,000		219385	91
	Myriophyllum spicatum; Water milfoil;	4 CM APEX	32 D	EC, GR		12,700	212262	74
	Myriophyllum spicatum; Water-miffoil;	4 CM APEX	32 D	ECSUBM *		7,600	212262	74
	Myriophyllum spicatum; Water - milfoil;	4 CM APEX	32 D	EC ₅₀ BM *		2,500	212262	74
	Myriophyllum spicatum; Water—milfoil;	4 CM APEX	32 D	EC ₅₀ GR *		5,100	212262	74
	Salmo trutta; Brown trout;	ALEVIN	28 D	ΓC_{50}	19		213472	06
	Salmo trutta; Brown trout;	ALEVIN	42 D	LC_{50}	72		213472	06
	Salmo trutta; Brown trout;	ALEVIN	21 D	ΓC_{50}	84 to 105		213472	06
	Salmo trutta; Brown trout;	ALEVIN	42 D	LC50	15		213472	S :
	Salmo trutta; Brown trout;	ALEVIN	28 D	LC ₅₀	79		213472	90
	Salmo trutta; Brown trout;	FERT BGG	<4 MO	HAT		<677	213472	06
	Salvelinus fontinalis; Brook trout;	FRY	43.2 H	LT_{50}	1,000		216632	80
	Salvelinus fontinalis; Brook trout;	FRY	7.3 D	$_{ m LT}_{ m 50}$	630		216632	80
	Salvelinus fontinalis; Brook trout;	FRY	79.2 H	LT50	200		216632	80
	Salvelmus fontmalis; Brook trout;	ADULI, 25-30 CM	SD	TET	320		216632	80
	Salvelinus fontinalis; Brook trout;	FRY	86.4 H	15°	1,000		216632	80
	Salvelmus fontmalis; Brook trout;	FRY	11.5 D	Γ_{S0}	8		216632	Q (
	Salvelmus Iontmans; Brook trout;	FK Y, 22—23 MM	10.6/D	50 LT 80	084		210188	08
	Salvelmus fontmails; Brook trout;	FK!	4./D	L.150	000		210032	08
	Salvelinus fontinalis; Brook trout;	FRY, 22-23 MM	19.67 D	LISO	470		216188	08
	Salvelinus fontinalis; Brook trout;	FRY	SD	$_{250}$	1,000		216632	80
	Salvelinus fontinalis; Brook trout;	FRY, 22-23 MM	20.83 D	LT50	20		216188	08 08
	Salvelinus fontinalis; Brook trout;	FRY	50.4 H	LT50	900		216632	08
	Salveimus tontmalis; Brook trout;	FK Y, 22-23 MM EDV	4./9 D	L150	7.5		216183	08
	Salvelmus Iontimans; Brook front;	FRI FDV 22 22306	H 2./0	11.50	000		210032	00
	Salvellius Idiluitatis, Dioda il Out,	FAT, 22-23 MAN HVED BGGS	0.42.0 CI A	* MOB *	320		216632	08
	Salvelinus fontinalis: Brook trout:	FRY. 22-23 MM	>20.83 D	LTE	10		216188	8
	Salvelinus fontinalis; Brook trout;	0.2G, 30D	3D	GRO *		268	213592	91
	Salvelinus fontinalis; Brook trout;	FRY, 22-23 MM	>20.83 D	LTs	500		216188	80
	Salvelinus fontinalis; Brook trout;	FRY	55.2 H	LT.	200		216632	80
	Salvelinus fontinalis; Brook trout;	FRY, 22-23 MM	>20.83 D	LTS0	200		216188	80
	Salvelinus fontinalis; Brook trout;	FRY	38.4 H	LT ₅₀	200		216632	80
	Salvefinus fontinalis; Brook trout;	0.2G, 30D	26 D	MOR *	268		213592	91
	Salvelinus fontinalis; Brook trout;	FRY	5.2 D	LT_{50}	100		216632	80
	Salvelinus fontinalis; Brook trout;	RECENTLY HATCHED FRY	SD	LET	320		216632	80
Aluminum (cont.)	Salvelinus fontinalis; Brook trout;	YEARLINGS, 13-17 CM	SD	LET	320		216632	80
Aluminum chloride	Ambystoma opacum; Marbled salamander;	EGGS	8.0	ΓC_{50}	2,280		216199	78
	Brachydanio rerio; Zebra danio, zebrafish;	LARVAE, 7-8 D POST-SPAWN	48 H	roso.	106,000		311199	88
	Brachydanio rerio; Leora danio, zeoralisn;	LAKVAE, /=8D FOSI =SFAWN	4 6 H (1	وچېر :	80,000		311199	S f
	Carassus aurams; Coldissi;	SO CON	U/ H/10	+ 05)-T	130		513503	% F
	Cincinonas parametram, expression,	TATA	11 /1:0	1	000		C00717	C/

Table O.1 – 9 AQUIRE Freshwater Toxicity Information (μ g/L) AOC 57

Property Property	Special Common, mirror, colored, street, App. Expost Expost App. Expost App. Expost App. Expost App. Expost App.			Devens, massachusetts	-					
Oppsidus caption Common, mirror, colored, carry 7,5-45 Okt 104-123 of 41	Oppition caption Common, mirror, colored, carry: 7.5-4.5 M, 185-12.5 G	Chemical Name	Species	Age	Exposure	Effect	Effect Concentrati		AQUIRE Reference	Year
Oppmen apple Common, mitters colored approach and the colored approach a	Oppinum applic Controls and Profit Control of the Profit Control		•				Lethal	ublethal	Number	Publication
Options caption common, minro, colored, arg. 75 - 54 CM, 110 - 12.5 G 54 H NOR 2.00 21558	Options arapic Common, mixtor, colored, array 75-45 CM, 110-1250 481 NOR 2000 51558 51558 51558 51558 51598 51		Overinus carejo; Common, mirror, colored, care;		24 H	MOR •	. I		315166	81
Opportunity of the control of the	Options applied between control of the co		Christic comic: Common missor colored com:	7 S - 8 S CM 40 S - 17 S C	11 67	NOW.	9,000		001616	70
Options apply Common, mitror, colored, erry; 7-5 of Mo, 1-1.20 24 H NOR1 4.00 215785	Opposition complex continues of continues o		Cypinas carpio, Common, marton, colored, carp,	7.3 – 8.3 CM, 10.3 – 12.3 G	49 F	MOR	2,000		315166	81
Opposite caption component street colored capting 7.5 ± 5 0 kt, 10 ± 1.25 4 ± 1 MON * 2,000 31596 Deplate apple Common, mitters, colored capty 7.5 ± 5 0 kt, 10 ± 1.25 4 ± 1 6 ± 1 5 ± 10 to 1.25 1.40 31596 Deplate apple Common, mitters, colored capty 1.2 ± 5 to k, 10 ± 1.25 4 ± 1 6 ± 1 1.40 31596 Deplate apple Common, mitters, colored capty 1.2 ± 5 to k, 10 ± 1.25 4 ± 1 6 ± 1 1.40 31596 31596 Deplate apple Common, mitter, colored capty 1.2 ± 5 to k, 10 ± 1.25 4 ± 1 6 ± 1 1.40 31596	Oppsing composition for the first colored curp. 1 2 2 5 0 1 10 - 12 0 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		Cyprinus carpio, Common, mirror, colored, carp,	6.5 CM, 10.5—12.5 G	74 H	MOK .	4,000		315166	81
Opposite a capito common, mirror colored carry 75-85 Okt 100-1237G 48.1	Oppming any pick common, mirror, colored, arry p. 15-45 Okt, 104-121G 431 modes MOR* 8,000 313164 Oppming a cypic Common, mirror, colored, arry p. 15-45 Okt, 104-121G 481 modes 481 modes 1400 modes 1400 modes 15100 modes <td< td=""><td></td><td>Cyprinus carpio; Common, mirror, colored, carp;</td><td>7.5-8.5 CM, 10.5-12.5 G</td><td>48 H</td><td>MOR .</td><td>2,000</td><td></td><td>315166</td><td>81</td></td<>		Cyprinus carpio; Common, mirror, colored, carp;	7.5-8.5 CM, 10.5-12.5 G	48 H	MOR .	2,000		315166	81
Compute misser, where the colored, array 15-45 Cot, 10,3-11,2 G	Opening an again, were first. 75 - 65 OM, 105 - 125 G 48 H NORT LOG 125 G Diplate an apic, where first. 13 H 6 H EG/M (2-b) 1 1,000 202 202 202 202 202 202 202 202 202 202		Cyprinus carpio; Common, mirror, colored, carp;	7.5-8.5 CM, 10.5-12.5 G	24 H	MOR *	8,000		315166	8
Department magnet, Water Res. 121 121 121 121 121 121 121 122 12	Digital magnit Vater field 11		Cyprinus carnio: Common, mirror, colored, carn:	7.5-8.5 CM, 10.5-12.5 G	48 H	WOB *	000 8		215166	: 5
Displayin ages Valve fiber 11	Department of the control of the c		Darbaia mama Water Geo.		1 4	300	00010		porcic	7 6
Department Dep	Department Dep		Dapinia magna, water nea,	H 71	217	ECSOIM !		1,400	2120212	7.5
Depthis ampsi, Water Res. 11 11 11 11 11 11 11	Depulsion again, Water Res. 12 H 44 H EC., MA 1,00000 60 212022		Daphnia magna; Water ilea;	4 H	64 H	$EC_{50}IM$ (Calc)		1,400	212054	48
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Cambula affilis, Mosquelidit, Posilidae. All T. FEMALE A	Controlled in Michigate Registrated		Danhnia mama: Water flea.	17 H	5	EC 1012		003	20000	1 6
Controlled a filtin Mostpoint of Processing Activation of Processing	Constraint after the Constraint of the Constraint after the Constraint		Dapania magna, water mea.	12 II	U.12	ECSONE !		080	770717	7.7
Commission filting integrated broadlinger; AUUT, FRIAALE 48 H LC ₀ (10-b) 25,00 20,008 10,008	Controllate in November Controllate ADULT: FRALE September ADULT: FRALE September Controllate in November Controllate ADULT: FRALE September Controllate in November Controllate in November Controllate in November Controllate ADULT: FRALE September Controllate in November Controllate Co		Euglena gracius; Flagellate euglenoid;	XX.	3 H	MOR •	1,000,000		212863	73
Combinis affilia (continue) Countist affilia (continue) Coun	Combinis affiliary Sequelucity, Postillidae; ADULT, FRIAALE Soft LC _G Coh. 25.00 21038 ADULT, FRIAALE Soft LC _G Coh. 25.00 21038 ADULT, FRIAALE Soft LC _G Coh. 25.00 21038 ADULT, FRIAALE Soft LC _G Coh. 25.00 21038 ADULT, FRIAALE Soft LC _G Coh. 25.00 21038 ADULT, FRIAALE Soft LC _G Coh. 25.00 21038 ADULT, FRIAALE Soft LC _G Coh. 25.00 21038 ADULT, FRIAALE Soft LC _G Coh. 25.00 21038 ADULT, FRIAALE Soft Coh. 25.00 21038 ADULT, FRIAALE Soft Coh. 25.00 21038 ADULT, FRIAALE Soft Coh. 25.00 21038 ADULT, FRIAALE Soft Coh. 25.00 21038 ADULT, FRIAALE Coh. 25.00 21038 ADULT, FR		Gambusia affinis; Mosquitofish; Poeciliidae;	ADULT, FEMALE	48 H	LCs, ? (Cale)	27.500		210508	52
Combine in this keepinding, control (activated as a complete transfer of combine and the keepinding) Control (activated as a complete transfer of combine and thick becaulting) Control (activated as a complete transfer of complete and transfer of complete and transfer (activated as a complete and transfer of complete and transfer (activated as a complete and transfer of complete and transfer (activated as a complete and transfer of complete and transfer (activated as a complete and transfer of complete and transfer (activated as a complete and transfer of complete and transfer (activated as a complete and transfer of complete and transfer (activated as a complete and transfer of complete and transfer (activated as a complete and transfer of complete and transfer (activated as a complete and transfer of complete and transfer (activated as a complete and transfer of complete and transfer (activated as a complete and transfer of complete and transfer (activated as a complete and transfer of complete and transfer (activated as a complete as a comple	Combines in this controlled:		Gambusia affinist Moconitofish: Doscillidae.	ADIT TEMATE	1 7 7	(-1.0) (-1.1	20,500		01000	; {
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Accordance Acc	Controlled the Designed Control		Gambusia affinis; Mosquitolish; Poeciliidae;	ADULT, FEMALE	H 96	LC _{f0} ? (Calc)	27,100		210508	27
Micropiten and Micr	Micropitate admission transference of the processor of		Gambusia affinis: Mosquitofish: Poeciliidae:	ADITIT BEMALE	H 90	(ale) • GOM	20.400		210500	. 5
New Control Principle 1975	Microphota registrate the control of the control				1100	Linear Care)	OD+'07		210.00	6
Microphotan myles, Rathow troat, doubtden trout EGGS 25	Microphotan pikes, Rathow total, dotalidan trout. EGGS 25 D LC ₂ 0 50 51 51 51 51 51 51 5		Micronyla carolinensis; Narrow mouthed trog;	EGGS	7.D	rc ₂₀	20		215305	78
Occorphorabus making stablew treat, dendleden treat. FINCERLING, 6 WK 23D LLC ₂ , 3 56 3146, 157 218509 Occorphorabus making stablew treat, dendleden	Occorphonism gries Rathow trent, dended mitters FINGERLING, 6 WK 23D 1.1C, 3 3 3 3 3 3 3 3 3		Micropterus salmoides; Largemouth bass;	EGGS	8D	LCs	170		216199	78
Occopypation might Relation train Principal Relation Principal Relation Principal Relation Principal Relation Principal Relation Principal Relation Principal Relation Principal Relation Principal Relation Principal Relation Principal Relation Principal Relation Principal Relation Principal Relation Principal Relation Principal Relation	Conclude to this is ballow true, decaded to the confident to the confide		Oncorhimohus mukise: Dainhour trout donaldeon trout:	いってい		00.	9		10000	2 6
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Concorphyshum gries, Ranhove treat, Canabidons treat, Concorphyshum gries, Ranhove treat, Canabidons treat, Concorphyshum gries, Ranhove treat, Canabidons treat, Concorphyshum gries, Ranhove treat, Canabidons treat, Concorphyshum gries, Ranhove treat, Canabidons treat, Concorphyshum gries, Ranhove treat, Canabidons treat, Concorphyshum gries, Ranhove treat, Canabidons treat, Concorphyshum gries, Ranhove treat, Canabidons treat, Concorphyshum gries, Ranhove treat, Canabidons treat, Concorphyshum gries, Ranhove treat, Canabidons treat, Concorphyshum gries, Ranhove treat, Canabidons treat, Concorphyshum gries, Ranhove treat, Canabidons treat, Concorphyshum gries, Ranhove treat, Canabidons treat, Concorphyshum gries, Ranhove treat, Canabidons treat, Concorphyshum gries, Ranhove treat, Canabidons treat, Concorphyshum gries, Ranhove treat, Canabidons treat, Concorphyshum gries, Ranhove treat, Canabidons treat, Concorphyshum gries, Ranhove treat, Canabidons treat, Concorphyshum gries, Ranhove treat, Canabidons treat, Concorphyshum gries, Ranhove treat, Gandalons treat, Concorphyshum gries, Ranhove treat, Gandalons treat, Concorphyshum gries, Ranhove treat, Gandalons treat, Concorphyshum gries, Ranhove treat, Gandalons treat, Concorphyshum gries, Ranhove treat, Gandalons treat, Concorphyshum gries, Ranhove treat, Gandalons treat, Concorphyshum gries, Ranhove treat, Gandalons treat, Concorphyshum gries, Ranhove treat, Gandalons treat, Concorphyshum gries, Ranhove treat, Gandalons treat, Concorphyshum gries, Ranhove treat, Gandalons treat, Concorphyshum gries, Ranhove treat, Gandalons treat, Concorphyshum gries, Ranhove treat, Gandalons treat, Concorphyshum gries, Ranhove treat, Gandalons treat, Concorphyshum gries, Ranhove treat, Gandalons treat, Concorphyshum gries, Ranhove treat, Gandalons treat, Concorphyshum gries, Ranhove treat, Gandalons treat, Concorphyshum gries, Ranhove treat, Gandalons treat, Concorphyshum gries, Ranhove treat, Gandalon	Concertypother mysics Randron trout. Generati		Oncorhynchus mykiss; Rambow trout, donaldson trout;	FINGERLING, 6 WK	9.25 D	• PHY		5.140, 1.570	218830	73
Oncocybyschein wigker Rahow rotted, from Grand or with the control of t	Occopyschum griek Rahbour trans. Profesting 6, 400 450 177, 6 1913		Oncorhynchus mykiss: Rainbow trout, donaldson trout:	EGGS	28.D	10.	260		216100	78
Occopyagina mysike, harbover treat, denalezon treat, FINGERLING, 1906, 45.0 THT 5.13 5.200, 5.05 5.200	Occayippatian supikes, Rabboor treat, Chankloon treat, FROFEELING, 11 No. 45 D		Openshinghing multier Dambour trant donalden trant.	ON A CIM INC. A NO.	1 2 4	200			21012	۶ (
Octoby-polius mykist, Rainbour tract, Genislation trout; FINGERLLING, 6 W 4.9 D LT ₀ 5.20, 5.09 219233 1850 Octoby-polius mykist, Rainbour tract, Genislation trout; FINGERLLING, 6 W 4.9 D LT ₀ 5.20	Oncolypichia mysike: Rabbow rical, chandleson trout: PROTEBLING, 8 MG		Officerity in the single of the state of the	FINGERLING, 0 MO	4°	PHY:		514; 514	218830	73
Oncolyphotals mykist, Rainbow trust, Genaldon trout; FINCHERLENG, 6 MG 4,7D FIFT* 5,200, 5,00 219383 Oncolyphotals mykist, Rainbow trust, Genaldon trout; FINCHERLENG, 6 MG 7,4D LT ₀ 5,240 219383 Oncolyphotals mykist, Rainbow trust, Genaldon trout; FINCHERLENG, 6 WK 7,52 H LT ₀ 5,240 219283 Oncolyphotals mykist, Rainbow trust, Genaldon trout; FINCHERLENG, 11 WK 45D GRO 5,14 219283 Oncolyphotals mykist, Rainbow trust, Genaldon trout; FINCHERLENG, 11 WK 45D GRO 5,14 519283 Oncolyphotals mykist, Rainbow trust, Genaldon trout; FINCHERLENG, 11 WK 3,89D LT ₀ 5,34 5,13233 Pimphale promable Therefore thintone; FINCHERLENG, 11 WK 3,89D LT ₀ 5,44 5,13233 Pimphale promable Therefore diminone; 10 DLARVAE, CA 1,4D MAR 5,100 5,100 Pimphale promable Therefore diminone; 10 DLARVAE, CA 1,4D MAR 5,100 5,100 Pimphale promable Therefore the minone; 10 DLARVAE, CA 1,4D MAR	Oncolyphodus mykins, Rathoev tend, donaldons treat; FINGERLELING 6 WK 4,7D FIFT* 5,200, 5,00 19328 Oncolyphodus mykins, Rathoev tend, donaldons treat; FINGERLELING 6 WK 7,4D 117.0 5,140 5,186 19328 Oncolyphodus mykins, Rathoev treat, donaldons treat; FINGERLELING 1 WK 7,5D 6,7D 6,7D 1,70 5,140 5,140 5,1328 1,9228 Oncolyphodus mykins, Rathoev treat, donaldons treat; FINGERLELING 1 WK 45D GRO 6,7D 5,140 5,142 5,1928 1,9228 Oncolyphodus mykins, Rathoev treat, donaldons treat; FINGERLELING 1 WK 45D GRO 6,7D 5,140 5,140 5,142 5,142 1,9228 Pinmephale promate, Faderd minnow; FINGERLELING 1 WK 45D GRO 6,63 3,1300 1,12283 1,1200 1,12283 1,1200 1,12283 1,12283 1,12283 1,12283 1,12283 1,12283 1,12283 1,12283 1,12283 1,12283 1,12283 1,12283 1,12283 1,12283 1,12283 1,12283		Oncorhynchus mykiss; Rainbow trout, donaldson trout;	FINGERLING, 11 WK	43.9 D	LT,	513		219328	71
Oncotypedus mysics Rainbow trott, dendeform trott; FINCERLING 6 MO	Oncolphychian mykitz, Rahbow troat, Gonaldonn troat; PRICERLING 6 MD 13.95 17.70 5.23 137938 Oncolphychan mykitz, Rahbow troat, Gonaldonn troat; PRICERLING 6 MD 45 D GRPO 5.14 5.188.8 137938 Oncolphychan mykitz, Rahbow troat, Gonaldonn troat; PRICERLING 1 WW 45 D GRPO 5.14 5.1928 137938 Oncolphychan mykitz, Rahbow troat, Gonaldon troat; PRICERLING 1 WW 45 D GRPO 5.14 5.1928 137938 Oncolphychan mykitz, Rahbow troat, Gonaldon troat; PRICERLING 6 MO 45 D GRPO 5.14 5.1928 137938 Promphate mykitz, Rahbow troat, Gonaldon troat; PRICERLING 6 MO 45 D GRPO 5.14 5.1928 137938 Promphate promash; Falled minnow; PRICERLING 6 MO 45 D GRPO 5.14 5.1928 13900 13900 Promphate promash; Falled minnow; 10 D LARVAE 10 O 0.05 H MOR 5.00 dO 13080 13000 13083 Promphate promash; Falled minnow; 10 D LARVAE 2 M NOF MOR		Oncorhynchus mykiss; Rainbow trout, donaldson trout;	FINGERLING, 6 WK	4.7 D	• AHd		5 200 5 050	218830	73
Oncorhymetra mytics Rainbow troat, densidation troat: FINGERLING 6 WK	Oncotypination mykits, Rainbow troat, densidion troat: PRICERLING, 6 WG 74,60 117,40 51,40		Oncorhynchus mykise. Rainbow trout donaldson trout-	FINGER ING 6 MO	31.05.0	£1	060.5		210000	
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Oncohypothen supidis Rainbow troat, donaldon rout. FNOERLING, 6 WA	Protechypothen supplies Rathow treat, donaldson roust. PROGERLING, 6 WA		Oncornynchus mykiss; Kambow trout, donaldson trout;	FINGERLING, 6 WK	7.46 D	$L\Gamma_{50}$	5,140		219328	71
Outcorpywelts mykist; Raibow troat, chandleon trout; FINGERLING, 6 WG	Oncorphycheu profiles Rabbow treat, donaldson rout: FNOERLING, 11 WK 71,27 H CIT,0 5,200 219238		Oncorhynchus mykiss; Rambow trout, donaldson trout;	FINGERLING, 6 MO	45D	GRO *		51.6; 51.6	218830	73
Outcotypeche mykist Rainbow (rott, dendelson trout; PinGERLING, 1 WK	Outcotypother mykist: Rainbow (rott.) FINGERLING, 1 WK 45D GRO 519 219228		Oncorhynchus mykiss; Rainbow trout, donaldson trout;	FINGERLING, 6 WK	71.52 H	LT	5,200		219328	71
Oncothymchu mykist Rainbow trout, donalskon trout; FINCERLING, 6MO 45D GRO 516 219238	Outcothyrethal mykist, Rainbow trout, Gonalston treut; FINGERLING, 6 MO 45D GRO 516 219233 19223		Oncorhynchus mykiss; Rainbow trout, donaldson trout;	FINGERLING, 11 WK	45 D	GRO.		\$13	210328	17
Oncordynatus mysis: Rainbow troat, donaldson trout. FINGERLING; 6 MO 45D GRO 516 219238	Oncorty)scholas mykis; Rainbow trout, donaldson trout; FINGERLING, 11WK 45D GRO		Oncorhynchits mykiss: Rambow trout, donaldson trout-	FINCER ING 6 MO	4577	* Ca5		217	110378	: 6
Proceint State of the control of t	Principlate growth strict Randown tront, and anticons, and the principlate growth strict Randown tront, and anticons, and the principlate growth strict Randown tront, and anticons, and the principlate growth strict Randown tront, and anticons, and the principlate prometals. Pulsated minnow. Principlate prometals. Pulsa		Oncorhynchis mykies: Painhow trout donaldeon trout-	PINCEDI INC. 6 MO	454	* (40		7 53	21022	7 6
Principalization tour, contained tour, conta	Principalization from the control principal product from the control principal princ		Occupant and an address of the contract of the formation	ENICEDIA 11 MIL		ONO.	1	0.1.0	77370	7.7
Principales promeia: Pageiale: NAK 14D 14D 14T 14T 14D 1	Principales promeis: Particular DLARVAE		Chechinghelius inglass, Ranibow troat, dollarusoli trout,	FINGERFING, 11 WA	38.9	17.50	5,140		219328	7.1
Finephales promelar Patterd minnow; LARVAE, <24H 4D HAT* 66:33 213070	Pinnephales prometar; Fathered minnow; LARVAE. < 24 H 14 D 14 D 15 O O O O O O O O O O O O O O O O O O		Peranema trichophorum; Flagellate;	NX	0.17 H	LET	>1,000,000		212863	73
Finephales promelas; Fathead minnow; 20D 10	Flimephales promelas: Pathead minnow; 20 DLARVAE 10 99 D		Pimephales promelas; Fathead minnow;	LARVAE, <24 H	14 D	GRO *		66; 35	213070	89
Pimephales promels, Pathead minnow; 20D LARVAE 10.09D HIS 10.040D 13.132 Pimephales promels, Pathead minnow; 12D LARVAE 10.06 H MOR 50 to 400 21.3152 Pimephales promels, Pathead minnow; 12D LARVAE 14D MOR 50 to 400 21.0035 Pimephales promels, Pathead minnow; 12D LARVAE 14D MOR 50 to 400 21.0035 Pimephales promels, Pathead minnow; 12D LARVAE 14D MOR 66.35 21.3070 Pimephales promels, Pathead minnow; 12D LARVAE 24H MOR 66.35 21.3070 Pimephales promels, Pathead minnow; 12D LARVAE 24H MOR 66.35 21.3070 Pimephales promels, Pathead minnow; 12D LARVAE 24H MOR 66.35 21.3070 Pimephales promels, Pathead minnow; 12D LARVAE 24H MOR 66.35 21.3070 Pimephales promels, Pathead minnow; 12D LARVAE 24H MOR 66.35 21.3070 Pimephales promels, Pathead minnow; 12D LARVAE 24H MOR 66.35 21.3070 Pimephales promels, Pathead minnow; 24H EC. ₂₀ IM ? 6.370 311972 Physical Resource; 24H EC. ₂₀ IM ? 6.370 311972 Physical Resource; 24H EC. ₂₀ IM ? 6.370 311972 Physical Resource; 24H EC. ₂₀ IM ? 6.370 311972 Physical Resource; 24H EC. ₂₀ IM ? 6.370 311972 Physical Resource; 24H EC. ₂₀ IM ? 6.370 311972 Physical Resource; 24H EC. ₂₀ IM ? 6.370 311972 Physical Resource; 24H EC. ₂₀ IM ? 6.370 311972 Physical Resource; 24H EC. ₂₀ IM ? 6.370 311972 Physical Resource; 24H EC. ₂₀ IM ? 6.370 311972 Physical Resource; 24H EC. ₂₀ IM ? 6.370 311972 Physical Resource; 24H EC. ₂₀ IM ? 6.370 311972 Physical Resource; 24H EC. ₂₀ IM ? 6.370 311972 Physical Resource; 24H EC. ₂₀ IM ? 6.370 311972 Physical Resource; 24H EC. ₂₀ IM ? 6.370 311972 Physical Resource; 24H EC. ₂₀ IM ? 6.370 311972 Physical Resource; 24H EC. ₂₀ IM ? 6.370 311972 Physical Resource; 24H EC. ₂₀ IM ? 6.370 311972 Physical Resource; 24H EC. ₂₀ IM ? 6.370 311	Pincephales promelas; Fathead minnow; 30 D		Pimephales promelas: Fathead minnow:	EMBRYO	4.0	HAT *		36.35	213070	08
Pimephales prometat: Fatherd minnow; 12 D LARVAE 10 06 H MOR 50 to 400 210836 10884 MOR 50 to 400 210836 10 06 H MOR 50 to 400 210836 2	Principales prometar; Fathered minow; 12D LARVAE 105 H MOR 105		Pimenhales promelas. Rathead minnow.	30 D	C 001 01	THE STATE OF THE S		30 00 60	21270	6 6
Principales prometas; Fatherad minnow; TUTENILE 109.6H MOR 5010.400 210836 2108	Finephales promels: Fauteau limitow, Finephales promels: Fauteau limitow, Finephales promels: Fauteau limitow, Finephales promels: Fauteau limitow, Finephales promels: Fauteau limitow, Finephales promels: Fauteau limitow, Finephales promels: Fauteau limitow, Finephales promels: Fauteau limitow, Finephales promels: Fauteau limitow, Fauteau lil		Dimerkales promotes; I carear minimum,	700	760100	CIR.		30 10 00	791617	₹ :
Principales prometas; Fathead minnow; DUARNAB 14D MOR 50 to 400 210836	Primephales promelas; Fathead minnow; JULARVAE 1096 H MOR 5010 400 210385 21038		rinchiales prometas, raneau minnow,	12D LARVAE	H 06 01	MOK	20 to 400		210836	88
Pinephales promelas; Fathead minnow; 1D LARVAE 1.05 M MOR 50 to 400 2.10330	Pimephales promelas; Fathead minnow; 1D LARVAE 14 D MOR 50 to 400 10 LARVAE 10 LARVAE 14 D MOR 50 to 400 10 10 330 13 000 14 D MOR 50 to 400 13 000 13 000 14 D MOR 66; 35 13 000 12 863 13 000 12 863 13 000 12 863 13 000 12 863 13 000 12 863 13 000 12 863 13 000		Pimephales prometas; Fathead minnow;	JUVENILE	to 96 H	MOR	50 to 400		210836	88
Pimephales promelas; Fathead minnow; LARVAE, <24 H 14D MOR 66:35 213070 Pimephales promelas; Fathead minnow; LARVAE, <24 ADULT ADULT 2 MO	Pincephales promelas; Fathread minnow; LARVAE, <24H 14D MOR 66;35 213070 Pincephales promelas; Fathread minnow; LARVAE, <24H 14D MOR 66;35 213070 Tetrahymera pyriformis; Ciliate; ADULT ARM 1.5 MG DRY WT 14D PHY * (Calc.) 27,000 212863 Tropistemus lateralis; Beetle, ADULT, 7MM, 1.5 MG DRY WT 48 H EC ₅₀ IM ? 45,770 311972 Asellus aquaticus; Aquatic sowbug; ADULT, 7MM, 1.5 MG DRY WT 22 H EC ₅₀ IM ? 47,000 212863 Biomphalaria gabrata; Snail; ADULT, 4-4.5 SUTURE WHORL 24 H STR * 1,000 212853 Biomphalaria gabrata; Snail; ADULT, 4-4.5 SUTURE WHORL 24 H STR * 1,000 212853 Chargeony pseudograciiis; Amphipod; ADULT, 4 MM, 0.2 MG DRY WT 46 H EC ₅₀ IM ? 6,490 1,1972 Crangony pseudograciiis; Amphipod; ADULT, 4 MM, 0.2 MG DRY WT 6,64 EC ₅₀ IM ? 6,490 1,1972 Crangony pseudograciiis; Amphipod; ADULT, 4 MM, 0.2 MG DRY WT 6,64 EC ₅₀ IM ? 6,490 1,1972 Crangony pseudograciiis; Amphipod; ADULT, 4 MM, 0.2 MG DRY WT 6,64 EC ₅₀ IM ? 6,490 1,1972 Crangony pseudograciiis; Amphipod; ADULT, 4 MM, 0.2 MG DRY WT 6,64 EC ₅₀ IM ? 6,40 1,1972 Crangony pseudograciiis; Amphipod; ADULT, 4 MM, 0.2 MG DRY WT 6,64 EC ₅₀ IM ? 6,40 1,1972 Crangony pseudograciiis, Amphipod; ABD		Pimephales promelas; Fathead minnow;	1D LARVAE	to 96 H	MOR	50 to 400		210836	89
Pimephales promelas; Fathead minnow; ADULT	Pimephales promelas: Fathead minnow; ADULT ADULT 2MO REP 66.35 213070 Tetrahymena pyriformis: Cilate; ADULT ADULT ADULT ADULT ADULT ADULT ADULT ADULT ADULT AB BC ₅₀ IM 15.00 21.2863 Asellus aquaticus: Aquatic sowbig; ADULT, 7.MM, 1.5 MG DRY WT 72H BC ₅₀ IM 16.570 311972 Asellus aquaticus: Aquatic sowbig; ADULT, 7.MM, 1.5 MG DRY WT 72H BC ₅₀ IM 17.00 21.2863 Asellus aquaticus: Aquatic sowbig; ADULT, 7.MM, 1.5 MG DRY WT 72H BC ₅₀ IM 17.00 21.2863 Blomphalaria glabrata; Snail; ADULT, 4-4.5 SUTURB WHORL 24H STR 100 21.2853 Cladocerii Waler flas order, NR ADULT, 4.MM, 0.2 MG DRY WT 48H BC ₅₀ IM 12.800 311972 Crangonyx pseudograeliis: Amphipod; ADULT, 4.MM, 0.2 MG DRY WT 56H BC ₅₀ IM 12.800 311972 Crangonyx pseudograeliis: Amphipod; ADULT, 4.MM, 0.2 MG DRY WT 56H BC ₅₀ IM 12.800 311972 Crangonyx pseudograeliis: Amphipod; NR 1.5 - 8.5 CM, 10.5 - 12.5 G 2.4 H 2.800 2.1 MB 2		Pimephales promelas; Fathead minnow;	LARVAE, <24 H	14 D	MOR *	66:35		213070	80
Tetrahymana pyriformis; Clilate; NR	Tetrahymana pyrifornis: Cilate; NR		Pimenhales promelas: Fathead minnow:	ADITT	2.MO	* GHD		\$6.39	313070	ò
Tropistermus April Tropist	Tropistement Springural Particles ADULT		Tetrahymens miriformis: Ciliate.	a.z.	11710	1011 1011			210010	6
ADULT, AMM, 1.5 MG DRY WT	ADULT, 7MM, 1.5 MG DRY WT		The standard of the standard o	H HACE	0.1/ 17		3,200		717803	5/
AbOULT. 7 MM, 1.5 MG DRY WT	Abulit		ropistemus lateralis; Beetle;	AD UL1	14D	PHY (Calc)		27,000	212868	69
AbULT, 7 MM, 1.5 MG DRY WT 72 H BC ₅₀ IM? 4,370 311972 Biomphalaria gabrata, Snail; AbULT, 4-4.5 SUTURB WHORL 24 H STR 100 212853 Biomphalaria gabrata, Snail; AbULT, 4-4.5 SUTURB WHORL 24 H STR 1,000 212853 Biomphalaria gabrata, Snail; AbULT, 4-4.5 SUTURB WHORL 24 H STR 1,000 212853 Cladocera; Water flea order; NR	AbULT, 7 MM, 1.5 MG DRY WT 72 H EC.50 IM ? 4,370 311972	Numinum sulfate	Asellus aquaticus; Aquatic sowbug;	ADULT, 7 MM, 1.5 MG DRY WT	48 H	EC _{f0} IM?		6,570	311972	86
Biomphalaria gabrata; Snail; ADULT, 4-4.5 SUTURE WHORL 24 H STR 1000 212853	Biomphabria gabrata; Snail; ADULT, 4-4.5 SUTURE WHORL 24 H STR 100 212853		Asellus aquaticus; Aquatic sowbug;	ADULT, 7 MM, 1.5 MG DRY WT	72 H	EC. IM?		4.370	311072	8
STR 1,000 212853	STR STR		Biomphalaria glabrata: Snail:	ADULT 4-45 STITTIRE WHORL	24 H	• dry		001	217852	5 5
Control Cont	Control Cont	himinim mifate (cont.)	Diometra la sia ala beneta: Canil.	ADIT 4 45 STEETING WITODI		NIIC		001	CC0717	G :
Cangony pseudogracilis: Amphipod; ADULT, 4 MM, 0.2 MG DRY WT 48 H EC ₅₀ IM? 12,800 217183 Cangonyx pseudogracilis: Amphipod; ADULT, 4 MM, 0.2 MG DRY WT 48 H EC ₅₀ IM? 12,800 311972 Cangonyx pseudogracilis: Amphipod; ADULT, 4 MM, 0.2 MG DRY WT 96 H EC ₅₀ IM? 9,190 311972 Crustacea: Crustacean class: NR ABD * 5,000 217183 Cyprinus carpio; Common, mirror, colored, carp: 7.5 - 8.5 CM, 10.5 - 12.5 G Total control of the contr	Chalcoctal, water flat order, NNK ADULT, 4 MM, 0.2 MG DRY WT 48 H EC ₅₀ IM ? 12,800 217183	Manning sunate (cont.)	Dioimphalatia gladiata, Shali,	ADULI, 4-42 SOI URE WHORL	H 47	SIR.		1,000	212853	63
Crangonyt pseudogracilis; Amphipod: ADULT, 4 MM, 0.2 MG DRY WT 48 H EC ₅₀ IM? 12,800 311972	Crangonyx pseudogracilis; Amphipod: ADULT. 4 MM, 0.2 MG DRY WT 48 H EC ₅₀ IM? 12,800 311972		Cladocera; Water liea order,	NK	2 MO •	POP*		200	217183	78
Crangonyx pseudogracilis: Amphipod; ADULT, 4 MM, 0.2 MG DRY WT 96 H EC ₅₀ IM? 9,190 311972	Crangomyx pseudogracilis: Amphipod: ADULT, 4 MM, 0.2 MG DRY WT 96 H EC ₅₀ IM? 9,190 311972		Crangonyx pseudogracilis; Amphipod;	ADULT, 4 MM, 0.2 MG DRY WT	48 H	ECS0IM?		12,800	311972	98
Crustacea; Crustacean class; NR 2 MO * ABD * 500 217183 Cyprinus carpio; Common, mirror, colored, carp; 1.5-8.5 CM, 10.5-12.5 G MOR * 8,000 31516	Crustacea; Crustacean class; NR 2MO * ABD * S00 217183 Cyprinus carpio; Common, mirror, colored, carp: 7.5-8.5 CM, 10.5-12.5G 111		Crangonyx pseudogracilis; Amphipod;	ADULT, 4 MM, 0.2 MG DRY WT	H 96	ECtoIM?		9,190	311972	98
Cyprinus carpio; Common, mirror, colored, carp; 7.5-8.5 CM, 10.5-12.5G	Cyprinus carpio; Common, mirror, colored, carp; 7.5-8.5 CM, 10.5-12.5G		Crustacea; Crustacean class;	NR	2 MO *	ABD *		200	217183	78
		(Cynrinus carnio: Common, mirror colored, carn.	75-85 CM 105-125G	74 14	• acy	000 8		21516	2 2
11			J		11 12	NOW	0000		CIC	•
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		/AQUTOX.wk1		11						10-Mar-2000



216115 216115 216115

4,000 4,450 5,000 5,000 3,600

AQUIRE Freshwater Toxicity Information (µg/L) Table 0.1-9 **AOC 57**

Remedial Investigation Report

		Devens, Massachusetts						
					Effect	AQUIRE	L	Year
Chemical Name	Species	Age	Exposure	Effect	Concentration	Reference	nce	of
					Lethal Su	Sublethal Number	_	Publication
	Cyprinus carpio; Common, mirror, colored, carp;	7.5-8.5 CM, 10.5-12.5 G	24 H	MOR *	8,000	315166	166	81
	Cyprinus carpio; Common, mirror, colored, carp;	7.5-8.5 CM, 10.5-12.5 G	48 H	MOR *	2,000	315	315166	81
	Cyprinus carpio; Common, mirror, colored, carp;	7.5-8.5 CM, 10.5-12.5 G	48 H	MOR *	4,000	315	315166	81
	Cyprinus carpio; Common, mirror, colored, carp;	7.5-8.5 CM, 10.5-12.5 G	48 H	MOR *	4,000	315	315166	81
	Cyprinus carpio; Common, mirror, colored, carp;	7.5-8.5 CM, 10.5-12.5 G	48 H	MOR *	8,000	315	315166	81
	Daphnia magna; Water flea;	8 H, YOUNG	0.25 H *	roc*		136,000 212171	171	4
	Fundulus heteroclitus; Mummichog;	NR	36 H	LC100 (Cab)	2,200	212	212865	15
	Fundulus heteroclitus; Mummichog;	NR	5D	LC ₁₀₀ (Cab)	1,100	212	212865	15
	Gambusia affinis; Mosquitofish;	ADULT, FEMALE	24 H	LC_{ϵ_0} ? (Calc)	000'69	210	210508	57
	Gambusia affinis; Mosquitofish;	ADULT, FEMALE	48 H	LC ₅₀ ? (Cale)	38,000	210	210508	57
	Gambusia affinis; Mosquitofish;	ADULT, FEMALE	48 H	MOR * (Calc)	< 28,000	210	210508	57
	Gambusia affinis; Mosquitofish;	ADULT, FEMALE	H 96	LC_{40} ? (Calc)	37,000	210	210508	27
	Micropterus dolomieui; Smallmouth bass;	13.8(12-17) MM, 32.5(9-59) MG	30 D	GRO *		251.6 312	312723	87
	Micropterus dolomieui; Smallmouth bass;	LARVAE	30 D	MOR *	251.6	312	312723	87
	Micropterus dolomieui; Smallmouth bass;	LARVAE, 48 H POST-HATCH	H 96	MOR *	100	312723	:723	87
	Micropterus dolomieui; Smallmouth bass;	LARVAE, 48 H POST-HATCH	H 96	MOR *	196	312723	:723	87
	Micropterus dolomieui; Smallmouth bass;	LARVAE, 48 H POST-HATCH	H 96	MOR *	217	312	312723	87
	Micropterus dolomieui; Smallmouth bass;	LARVAE, 48 H POST-HATCH	H 96	MOR *	32	312	312723	87
	Micropterus dolomieui; Smallmouth bass;	LARVAE, 48 H POST-HATCH	H 96	MOR *	320	312723	:723	87
	Micropterus dolomieui; Smallmouth bass;	LARVAE, 48 H POST-HATCH	H 96	MOR *	26	312	312723	87
	Micropterus dolomieui; Smallmouth bass;	LARVAE, 48 H POST-HATCH	H 96	MOR*	260	312	312723	87
	Notemigonus crysoleucas; Golden shiner;	NR	45 D	MOR •	100,000	312	312756	98
	Notemigonus crysoleucas; Golden shiner;	NR	45 D	MOR *	100,000	312	312756	98
	Oncorhynchus mykiss; Rainbow trout, donaldson trout;	118-355 G, 22-31 CM FORK LENGTH	24 H	MOR *	910	212	212508	88
	Oncorhynchus mykiss; Rainbow trout, donaldson trout;	118-355 G, 22-31 CM FORK LENGTH	24 H	MOR *	9,100	212	212508	88
	Oncorhynchus mykiss; Rainbow trout, donaldson trout;	118-355 G, 22-31 CM FORK LENGTH	48 H	LET	9,100	212	212508	88
	Oncorhynchus mykiss; Rainbow trout, donaldson trout;	118-355 G, 22-31 CM FORK LENGTH	48 H	MOR *	910	212	212508	88
	Oncorhynchus mykiss; Rainbow trout, donaldson trout;	118-355G, 22-31 CM FORK LENGTH	72 H	MOR *	910	212	212508	88
	Oncorhynchus mykiss; Rainbow trout, donaldson trout;	118-355G, 22-31 CM FORK LENGTH	H 96	HEM *			212508	88
	Oncorhynchus mykiss; Rainbow trout, donaldson trout;	118-355 G, 22-31 CM FORK LENGTH	H 96	HEM *			212508	88
	Oncorhynchus mykiss; Rainbow trout, donaldson trout;	118-355 G, 22-31 CM FORK LENGTH	H 96	HEM *		910 212	212508	88
	Oncorhynchus mykiss; Rainbow trout, donaldson trout;	118-355G, 22-31 CM FORK LENGTH	H 96	MOR*	06	212	212508	88
	Oncorhynchus mykiss; Rainbow trout, donaldson trout;	118-355 G, 22-31 CM FORK LENGTH	H 96	MOR *	910	212	212508	88
	Oncorhynchus mykiss; Rainbow trout, donaldson trout;	50-80 MM	10 D	rc ₀	200,000	216	216520	80
	Oncorhynchus mykiss; Rainbow trout, donaldson trout;	50-80 MM	10 D	rco rco	20,000	216.	216520	80
	Oncorhynchus mykiss; Rainbow trout, donaldson trout;	50-80MM	42 H	ΓC_{100}	20,000	216	216520	80
	Oncorhynchus mykiss; Rainbow trout, donaldson trout;	50-80 MM	42 H	LC ₁₀₀	\$0,000	216	216520	80
	Oncorhynchus mykiss; Rainbow trout, donaldson trout;	50-80 MM	H 96	MOR *	20,000	216	216520	80
	Oncorhynchus mykiss; Rainbow trout, donaldson trout;	FINGERLING, 11 WK	45 D	* XHd		513 218	218830	73
	Salvelinus fontinalis; Brook trout;	14 MO, 210 MM, 130 G	24 H	LC_{50} ?	4,000	216	216115	75
	Salustime fontinalis. Brook treat-	14 MO 210 MM 130 G	24 H	109	4.450	216	216115	7.5

84 216115 312720 312720 312720 212700 311181 311181 283 1,800 3,800 283 400 LC100
LC100
MOR**
PHY*
LC50 ?
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MOR** LÇ, Ç, 26 H 10 D 27 H 1 17 EYED EMBRYO – LARVAE EYED EMBRYO – LARVAE EYED EMBRYO – LARVAE 11.5–16 MM < 4 H < 24 H Salvelinus fonthalis, Brook trout; Salvelinus fonthalis, Brook trout; Salvelinus fonthalis, Brook trout; Salvelinus fonthalis, Brook trout; Salvelinus fonthalis, Brook trout; Salvelinus fonthalis, Brook trout; Salvelinus fonthalis, Brook trout; Salvelinus fonthalis, Brook trout; Ceriodaphnia reticulata; Water slea; Daphnia magna; Water flea; Stizostedion lucioperca; Pikeperch; Aluminum sulfate (cont.) 57AQUTOX.wk1

Arsenic

14 MONTHS, 210 MM, 130 G

14 MO, 210 MM, 130 G

FINGERLING, 11 WK 14 MO, 210 MM, 130 G 14 MO, 210 MM, 130 G 14 MO, 210 MM, 130 G

Table O.1–9 AQUIRE Freshwater Toxicity Information (µg/L) AOC 57

Remedial Investigation Report

		Devens, Massachusetts	etts					
Chemical Name	Socional	Αυφ	Henogure	Fiffeet	Effect	i di	AQUIRE	Year
			o installation		Lethal	Sublethal	Number	Publication
	Daphnia pulex; Water flea;	< 24 H	48 H	LC50	1,900		311181	84
	Ictalurus punctatus; Channel catfish;	400 G	0.1 to 7 WK	RSD		1,910 to 2,500	315333	77
	Lepomis cyanellus; Green sunfish;	<4 YR, 5.5-90.7G	4 MO	HIS		1,000 to 20,000	311560	85
	Lepomis macrochirus; Bluegill;	NR	OW9	MOR *	2,000		212143	73
	Myriophyllum spicatum; water – milloit;	4 CM AFEA	32.0	EC50BM		2,500	707717	4 ;
	Myriophyllum spicatum; water – millon;	4 CM AFEA	32.0	ECCORN :		2,900	212202	4/
	Myriophyllum spicatum; Water—milloii;	4 CM APEX	32D	ECSOGN:		3,600	212262	4.
	Myriophyllum spicatum; Water – milloil;	4 CM APEX	32 D	ECSOGK *		4,100	212262	74
	Simocephalus vetulus; Water flea;	< 24 H	48 H	Γ_{50}°	1,700		311181	84
Barium	Daphnia magna: Water flea:	<= 24 H	24 H	rce	> 530,000		215184	80
	Daphnia magna; Water slea;	<= 24 H	48 H	LCS	410,000		215184	80
	Daphnia mama; Water flea;	<= 24 H	48 H	MOR*	68,000		215184	80
	Lemna minor; Duckweed;	20 COLONIES OR 40 FRONDS	4D	ECOGR		26,000	311789	86
	Myriophyllum spicatum; Water-milfoil;	4 CM APEX	32 D	EC, BM •		103,000	212262	74
	Myriophyllum spicatum; Water-milfoil;	4 CM APEX	32 D	EC. BM •		41,200	212262	74
	Myriophyllum spicatum; Water - milfoil;	4 CM APEX	32 D	EC, GR		113,000	212262	74
	Myriophyllum spicatum; Water-milfoil;	4 CM APEX	32 D	BC GR		83,800	212262	74
Barium chloride	Lemna minor; Duckweed	FRONDS	H 96	GRO		25000	283261	88
	Daphnia magna; Water flea	12 H	48 H	IMM		14500	228732	72
	Echinogammarus berilloni; Scud	NR	24 H	LC30	336,000		307710	98
	Gammarus pulex; Scud	NR	24 H	LC	3,980,000		307706	98
	Salmo trutta; Brown trout	YEARLING	48 H	rce	150,000		240072	74
	Austropotamobius pallipes pall; Crayfish	19-32MM	H 96	LCS	46,000		228813	73
	Gambusia affinis; Mosquitofish	ADULT, FEMALE	24 H	ro ² 0	2,910,000		215454	57
	Orconectes limosus; Crayfish	19-32 MM	H 96	LC30	78,000		228816	73
	Gambusia affinis; Mosquitofish	ADULT, FEMALE	H 96	MOR	66,200		215457	23
	Daphnia magna; Water flea	12 H	21 D	REP		8,900	228734	72
Codminm	Almas. Almas whytomisation almat	NATITE AT COMMINET	240 244 H	asa		3.4 +0.84.0	311873	V
	Algae: Algae phytonlankton algal mat	HXPO GRO PHASE	74 H	H)d		0.45 63 4.5	213/05) o
	Algae: Algae, phytoplankton, algal mat	PHYTOPLANKTON	14D	BMS *		100	313109	S 80
	Algae: Algae, phytoplankton, algal mat	NATURAL COMMUNITY	382 H	PGR		2.9 to 4.2	311823	\$
	Anabolia nervosa; Quiver fly	LARVAE	7D	LET	9,000,000		210725	52
	Anacystis nidulans; Blue – green algae	NR	48 H	BCF		500	312317	86
	Anacystis nidulans; Blue - green algae	NR	36 H	BCF		1,000	312317	86
	Anacystis nidulans; Blue – green algae	NR .	48 H	BCF		1,000	312317	98
	Anacystis nidulans; Blue – green algae	NR	36 H	BCF		10.000	312317	98
	Anacystis nidulans; Blue - green algae	NR	24 H	BCF		10,000	312317	98
	Anacystis nidulans; Blue – green algae	NR	48 H	BCF		10,000	312317	98
	Anacystis nidulans; Blue - green algae	NR	48 H	BCF		100	312317	98
	Anacystis nidulans; Blue - green algae	N.W.	12 H	BCF		2,000	312317	86
	Anacystis nidulans; Blue - green algae	N. T.	24 H	BCF		200	312317	98
	Anacystis nidulans; Blue – green algae	N.W.	24 H	BCF		2,000	312317	98
	Anacystis nidulans; Blue - green algae	XX.	36 H	BCF		100	312317	98
Cadmium (cont.)	Anacystis nidulans; Blue - green algae	XX.	36 H	BCF		2,000	312317	98
	Anacystis nidulans; Blue – green algae	NR:	24 H	BCF		1,000	312317	98
	Anacystis nidulans; Blue – green algae	N.K	24 H	BCF		100	312317	98
	Anacysus mountais, plue—green algae	NR ND	H 71	DC4		200	312317	00 %
	Anacystis midulans; blue—green algae	INK	H 64.	BCF		3,000	312317	9 % 80
	Anacystis niquians; Biue – green aigae	NR	Н 71	BCF		1,000	3123	0×

57AQUTOX.wk1

Table O.1–9 AQUIRE Freshwater Toxicity Information (μ g/L) AOC 57

Remedial Investigation Report

Chemical Name

Asellus aquaticus; Aquatic sowbug 8~10MM 96 H	BIO *	\$0 \$0 \$0	213466 213467	8 8 8
TO TO TATE	LCso.*	09	312041	85
ANY 100 TIME THE TOTAL T	1.05	80	311953	98
MM		370	311053	86
		0+7	CCCTTC	3 :
8-10 MM	01	009	312041	82

Table O.1 –9 AQUIRE Freshwater Toxicity Information (μg/L) AOC 57

Remedial Investigation Report Devens, Massachusetts

Cadmium (cont.)

		Devens, Massachusetts					
Chemical Name	Species	Age	Bxnosure		Effect Concentration	AQUIRE	Year
	•	þ			Lethal Sublethal	Number	Publication
nium (cont.)	Asellus aquaticus; Aquatic sowbug	JUVENILE, 1.60 MM	H 96	LCt	170	311953	98
	Asellus aquaticus; Aquatic sowbug	8-10MM	48 H	ro.	4,000	312041	85
	Asellus aquaticus; Aquatic sowbug	JUVENILE, 1.60 MM	H 96	ĽČ	150	311953	98
	Asellus aquaticus; Aquatic sowbug	ADULT, 9.87 MM	H 96	rc ³	600	311953	86
	Asellus aquaticus; Aquatic sowbug	ADULT, 9.87 MM	H 96	LC ₅₀	1.000	311953	98
	Asellus aquaticus; Aquatic sowbug	8-10MM	24 H	LC ₅₀	13,000	312041	85
	Asellus aquaticus; Aquatic sowbug	EMBRYO, STAGE C	H 96	LC_{50}	2,000	311953	98
	Asellus aquaticus; Aquatic sowbug	8-10MM	24 H	${ m LC}_{50}$	11,000	312041	85
	Asellus aquaticus; Aquatic sowbug	EMBRYO, STAGE D	H 96	LC ₅₀	300	311953	98
	Asellus aquaticus; Aquatic sowbug	JUVENILE, 5.92 MM	H 96	LC_{50}	540	311953	86
	Asellus aquaticus; Aquatic sowbug	8-10 MM	H 96	${ m FC}_{50}^{\bullet}$	99	312041	85
	Asellus aquaticus; Aquatic sowbug	JUVENILE, 3.52 MM	H 96	LC_{50}	230	311953	86
	Asellus aquaticus; Aquatic sowbug	JUVENILE, 5.92 MM	H 96	LC ₅₀	450	311953	86
	Asellus aquaticus; Aquatic sowbug	JUVENILE, 3.52 MM	H 96	$^{1}C_{50}$	320	311953	86
	Asellus aquaticus; Aquatic sowbug	JUVENILE, 30 D, 1.35 MM	H 96	ΓC_{50}	53	311953	98
	Asellus aquaticus; Aquatic sowbug	EMBRYO, STAGE C	H 96	LC_{50}	1,750	311953	98
	Asellus aquaticus; Aquatic sowbug	JUVENILE, 2.30 MM	H 96	LC_{50}	175	311953	98
	Asellus aquaticus; Aquatic sowbug	JUVENILE, 2.30 MM	H 96	LC ₅₀	170		98
	Astacus astacus; European crayfish	8-10CM	to 10 WK	HIS	2		91
	Astacus astacus; European crayfish	8-10 CM	2 WK	ENZ *			91
	Baetis rhodani; Mayfly	8-10MM	48 H	ΓC_{50}	4,000	312041	85
	Baetis rhodani; Mayfly	8-10MM	24 H	LC ₅₀ *	95,000	312041	82
	Baetis rhodani; Mayfly	8-10 MM	48 H	ΓC_{50}	2,200	312041	85
	Baetis rhodani; Mayfly		Н 96	LC ₅₀ *	50	312041	85
	Baetis rhodani; Mayfly	8-10MM	H 96	LC ₅₀	70	312041	85
	Bactis rhodani; Mayfly	8-10MM	24 H	LC.	00006	312041	85
	Brachionus calyciflorus; Rotifer	NEONATE	24 H	LC50	1,300		91
	Carassius auratus; Goldfish	5.0-20.9 G	14 D	HEM •	445		84
	Catostomus commersoni; White sucker	JUVENILE, 142 MM, 28.7 G	1 WK	RSD	099		87
	Ceriodaphnia reticulata; Water slea	< 4 H	48 H	$^{\mathrm{LC}_{50}}$	99	311181	84
	Channa punctatus; Snake -head catfish	FINGERLING	48 H	LC ₃₀	34,640	313173	88
	Channa punctatus; Snake-head catfish	FINGERLING	H 96	ΓC_{50}	18,500		88
	Channa punctatus; Snake -head catfish	FINGERLING	13D	GRO .	3,500		88
	Chironomidae; Midge family	LARVAE	12 MO	POP.	7.6		88
	Chirchomus plumosus; Midge	LARVA-SIATEL3	H 96	% 27 :	32,000	215356	89
	Chirchonnus plumosus, midge	LARVA-SIAIE LZ	H 06	ر د د د د	32,000	212320	2 3
	Chiralogue plumosus, Midge	LANVA-SIAIE LZ I ARVA-STATE I 4	H 2/	ر د د	32,000	215356	8 8
	Chirchonnes plumosus; Midge	LARVA-STATE L2	48 H		32.000	215356	89
	Chircnomus plumosus; Midge	LARVA-STATE L3	72 H	ĽČ	32,000	215356	68
	Chircnomus plumosus; Midge	LARVA-STATE L2	24 H	LÇ.	32,000	215356	68
	Chironomus plumosus; Midge	LARVA-STATE L3	24 H	1C ₅₀	32,000	215356	88
	Chircnomus plumosus; Midge	LARVA-STATE L1	24 H	LC30	21.530	215356	68
	Chircnomus plumosus; Midge	LARVA-STATE L4	H 96	LC_{50}	32,000	215356	89
	Chironomus plumosus; Midge	LARVA-STATE L4	24 H	LC_{50}	32,000	215356	89
	Chironomus plumosus; Midge	LARVA-STATE L3	48 H	$^{\mathrm{LC}_{50}}$	32,000	215356	89
•	Chircnomus plumosus; Midge	LARVA-STATE L4	48 H	ΓC_{50}	32,000	215356	68
	Chircnomus riparius; Midge	LARVA-STATE L1	24 H	LC ₅₀	53,610	215356	89
	Chirchomus riparius; Midge	LAKVA-SIAIE L4	24 H	ر ئ ئ	10,000	215356	œ :
	Chirconnus riparius; Midge	ATII DICTAR I ARIVAD	48 H	05. 10. 10.	10,000	215356	68
	Chirchonnus riparius; Midge	41n motar larvas	700	KSU	30 to 100	21272	88



10-Mar-2000

Contractive Market Contrac	Markar M			Devens, Massachuseus			Effect		AOUIRE	Year
Chicacoan province Marke LAKWA-STATE 127	Chicaconan operate Make LANA-STATE 19, 20 1, 144	Marion	Species	Age	Exposure	Bffect	Concentratio	uc	Reference	Jo
Colinocame injuries, Maley LAWA-STATE To \$7 11 LAG 1,599 21389	Colinoment injuries, Nation LAWA-STATE To STEE LOG 1,000 1,000 1,000	meainaine		,				Sublethal	Number	Publication
Chicacoani injuries (Maje) LANA-STATE To 81 LC2 13.00 13.33	Chicacoani opanic Maleje 15078 1	int)	Chironomus riparius: Midge	LARVA-STATE L2	72 H	ΓC_{50}	7,690		215356	58 80
LANAL-STATELL	LANYA-STATELL	(-111	Chirchomis riparity. Midge	EGGS	7 to 96 H	MOR *	1,000		215356	88
Heart	CAMPA-STAPE13		Chirch omise riparing: Midge	LARVA-STATE L3	24 H	ΓC_{50}	32,000		215356	68
Deciding	Decay Deca		Chicalonia ripaine Midre	LARVA-STATE L3	H 96	LC30	7,360		215356	83
December December	District District		Chicagonia hipothy, Midge	EGGS	7 to 96 H	MOR*	1,000		215356	89
10-13MA	Part		Chill Chounts Lipsaines, white Co	I ARVA - STATE 13	72 H	LCt	15,210		215356	83
Link	1,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0		Chironomus riparius, Miuge	10-12 MM	48 H	LC.	200,000		312041	85
Light Color Light Color	Light Color Light Color		Cuironomus riparius; miage	10-12 MM	H 96	LCS	300,000		312041	85
LCANA - SATHE 12	LAWA-STATE LAW		Chironomus riparius; Midge	I ABVA — STATE I 4	H 96	S C C	089'9		215356	89
LARVA-STATE LARVA-STATE	Characteristic Char		Chircnomus riparus; Midge	LAKVA-SIAID L+	17 PC	0001	10,000		215356	89
Decoration Dec	Decoration Color		Chironomus riparius; Midge	LAKVA-SIAIB LZ	11 1.7	1.C=1	10.000		215356	89
Decompose Deco	E-2006 E		Chircnomus riparius; Midge	LAKVA-SIAIE L4	1104	05.0 2.0 2.0 3.0 3.0 3.0 4.0 4.0 4.0 4.0 4.0 4.0 4.0 4.0 4.0 4	3 200		215356	80
10-12AM	Decomposition Control		Chironomus riparius; Midge	EGGS	H 47=>	MOK	000,000		212001	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \
LATAVA-STATE 1, 3	LATVA-STATEL 1		Chircnomus riparius; Midge	10-12 MM	24 H		200,000		312041	3
PARA-STATE 1.4 72.H LC ₂ 0 10,000 51,5350 -12.M2A - STATE 1.4 56.H LC ₂ 0 20,000 51,5351 -12.M2A - STATE 1.2 2.4 LC ₂ 0 7,000 51,5351 -12.M2A - STATE 1.2 2.4 LC ₂ 0 7,990 51,5351 -12.M2A - STATE 1.4 7.2 LC ₂ 0 7,990 51,5355 -12.M2A - STATE 1.4 7.2 LC ₂ 0 14,10 51,5355 -12.M2A - STATE 1.4 56.H LC ₂ 0 14,10 51,5355 -12.M2A - STATE 1.4 56.H LC ₂ 0 14,10 51,5355 -12.M2A - STATE 1.4 56.H LC ₂ 0 14,10 51,5355 -12.M2A - STATE 1.4 56.H LC ₂ 0 14,10 51,5355 -12.M2A - STATE 1.4 56.H LC ₂ 0 14,10 51,5355 -12.M2A - STATE 1.4 56.H LC ₂ 0 14,10 51,5355 -12.M2A - STATE 1.4 56.H LC ₂ 0 1,590 51,5355 -12.M2A - STATE 1.4 56.H LC ₂ 0 1,590 51,5355 -12.M2A - STATE 1.4 56.H LC ₂ 0 1,590 51,5355 -12.M2A - STATE 1.4 56.H LC ₂ 0 1,590 51,5355 -12.M2A - STATE 1.4 56.H LC ₂ 0 1,590 51,5355 -12.M2A - STATE 1.4 56.H LC ₂ 0 1,590 51,5355 -12.M2A - STATE 1.4 56.H LC ₂ 0 1,590 51,5355 -12.M2A - STATE 1.4 56.H LC ₂ 0 1,590 51,5355 -12.M2A - STATE 1.4 57.H LC ₂ 0 1,590 51,5355 -12.M2A - STATE 1.4 57.H LC ₂ 0 1,590 51,5355 -12.M2A - STATE 1.4 57.H LC ₂ 0 1,590 51,5355 -12.M2A - STATE 1.4 1,500 51,535 -12.M2A - STAMBER			Chirchonus riparius; Midge	LARVA-STATE L3	48 H	Γ_{S_0}	32,000		213330	80
Process	Park		Chirmomus rinarius: Midge	LARVA-STATE L4	72 H	ΓC_{50}	10,000		215356	60
December Process Pro	Process		Chicacomia sinarina Midas	10-12 MM	H 96	roji Toji	200,000		312041	82
LAWA-STATE L.	LAWA-STATE 24H LC,0 430 21356 21356 21400 2140		Chironomus ripatus, ivinge	SUBB	<=24 H	MOR*	10,000		215356	88
LARVA-STATE 24 H LC ₅₀ 9.990 213356 213556	LAWA-STATE 24 H LC ₀ 9.90 2.1356 1.2556 1.		Chironomus riparius; Midge	I ADVA - STATE I 2	H 96	LC	4,320		215356	88
LARVA-STATE LAG LA	LARVA-STATE LAG LA		Chirchomus riparius; Midge	I ADMA CTATE I 1	24 H	0°-1	066.6		215356	68
LARVA-STATIELA 4.2	LARVA-STATEL A.H LC_0 LC_0 LC_0 LARVA-STATEL A.H LC_0 LC_0 LARVA-STATEL LC		Chironomus tentans; Midge	LARVATSIAID LI	77 17		730		215356	89
LARVA-STATIE 1.5	$ \begin{array}{cccccccccccccccccccccccccccccccccccc$		Chironomus tentans; Midge	LAKVA-SIAIE LS	11 7/	1030	0.370		215356	80
LARVA-STATEL 190 10,000 21,000	$ \begin{array}{cccccccccccccccccccccccccccccccccccc$		Chironomus tentans; Midge	LARVA-SIATE L3	46 H	6501	1410		215356	80
LARVA-STATE L3	$ \begin{array}{cccccccccccccccccccccccccccccccccccc$		Chironomus tentans; Midge	LARVA-STATE L4	H 96	3. 3.	10,000		215356	<u> </u>
LARVA-STATE LA 48 H	LARVA-STATE LA		Chircnomus tentans; Midge	LARVA-STATE L3	24 H	, L.C.S.	10,000		212300	60
LARVA-STATEL 2	LARVA-STATE L2		Chironomus tentans; Midge	LARVA-STATE L4	48 H	05)1.	7,00		715256	68
LARVA-STATEL	LARVA-STATEL 1		Chircnomus tentans; Midge	LARVA—STATE L2	H 96	S. 1.	00		215350	60 80
LARVA-STATEL	LARVA-STATB L		Chircnomus tentans; Midge	LARVA-STATE L3	H 96	ري • دري	400		215256	6 8
LARVA-STATE L4	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$		Chironomus tentans; Midge	LARVA-STATE L2	H Z/	5. 5.	0.00		215256	` &
LARVA-STATE L2 24 H LC ₅ 0 440 21330 LARVA-STATE L4 24 H LC ₅ 0 10,000 21336 LARVA-STATE L4 24 H LC ₅ 0 10,000 21336 LARVA-STATE L2 48 H LC ₅ 0 210 210725 Jab RSD AND 4TH INSTAR 2D RSD RSD 10,000 210725 Jab ADULT 5 CM 7D RSD RSD 10,000 210725 Abit 20 Co.00 RSD RSD 10,000 210725 210725 mily 1 SUMMER 5,63 D LET * 20,000 210725 mily 1 SUMMER 5,63 D LET * 20,000 210725 mily 1 SUMMER 5,63 D LET * 20,000 210725 mily 1 SUMMER 5,64 D LET * 20,000 210725 mily 1 SUMMER 5,64 D LC ₅ 0 6,81 D 210725 mily 1 SUMMER 2 M LC ₅ 0 6,81 D 210725	LARVA-STATE L2		Chironomus tentans; Midge	LARVA-STATE L4	72 H	LC30	1,930		215370	66
LARVA-STATE LA	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$		Chirchomus tentans; Midge	LARVA-STATE L2	24 H	LC ₅₀	440		213330	66 6
LARVA-STATE L2	LARVA STATE L2		Chironomus tentans; Midge	LARVA-STATE L4	24 H	LC50	10,000		212320	8 8
LARVAB 7D LET 130,000 210725 ARD AND 4TH INSTAR 7D RSD 0.000 210725 Re whitefish 26.63 G 7D RSD 0.00125 210688 Re whitefish 26.63 G 7D RSD 0.00125 210725 mily 1 SUMMER 84 H LET * 20,000 210725 mily 1 SUMMER 33 H LET * 20,000 210725 mily 1 SUMMER 33 H LET * 20,000 210725 mily 1 SUMMER 363 D LET * 20,000 210725 mily 1 SUMMER 363 D LET * 20,000 210725 mily 1 SUMMER 364 D LET * 20,000 210725 mily 1 SUMMER 364 D LC30 6,981 312365 mily NR 24 H LC30 6,981 312365 NR NR 48 H LC30 6,981 312365	Part Part		Chironomus tentans; Midge	LARVA-STATE L2	48 H	LC_{50}	210		24000	9
SED SED SED SED SED 10,000 311481	Page Page		Chirchomus thummi: Midge	LARVAE	7D	LET	150,000		210725	37
ADULT SCM ADULT SCM ADULT SCM 26.63G 26.63G 20.63G 20.63G 20.63G 20.63G 20.60G 20.00C	ADULT SCM 1D RSD 0.3 312002 26.63G 25.63G PCF* 25.000 0.3 312002 2 SUNMER 84H LET* 25.000 210725 1 SUNMER 33 H LET* 20.000 210725 1 SUNMER 33 H LET* 30.000 210725 1 SUNMER 5.63 D LET* 50.000 210725 1 SUNMER 5.63 D LET* 50.000 210725 1 SUNMER 96 H LC50 687.4 312365 NR 96 H LC50 6.981 312365 NR 48 H LC50 6,981 312365 NR 96 H LC50 6,981 312365 NR 48 H LC50 6,981 312365 NR 48 H LC50 618.6 312365 NR 24 H LC50 33 312365 NR 24 H LC50 33 312365 NR </td <td></td> <td>Chironomus voshimatsui; Midge</td> <td>3RD AND 4TH INSTAR</td> <td>2D</td> <td>RSD *</td> <td></td> <td>10,000</td> <td>311481</td> <td>84.0</td>		Chironomus voshimatsui; Midge	3RD AND 4TH INSTAR	2D	RSD *		10,000	311481	84.0
26.63G 72D BCF* 0.000125 210088 2 SUNAMBRS 84 H LET* 25,000 210725 1 SUNAMBR 7D MOR * 13,000 210725 1 SUNAMBR 33 H LET * 20,000 210725 1 SUNAMBR 5.63 D LET * 30,000 210725 1 SUNAMBR 5.63 D LET * 50,000 210725 1 SUNAMBR 96 H LET * 50,000 210725 1 SUNAMBR 96 H LET * 50,000 210725 1 SUNAMBR 96 H LET * 50,000 210725 NR 48 H LC ₅ 0 6,981 312365 NR 96 H LC ₅ 0 6,981 312365 NR 48 H LC ₅ 0 618.6 312365 NR 48 H LC ₅ 0 618.6 312365 NR 48 H LC ₅ 0 618.6 312365 NR 48 H LC ₅ 0 618.6 312365	26.63 G 72 D BCF* 0.000125 210088 2 SUNAMBR 84 H LET* 25,000 210725 1 SUNAMBR 7D MOR * 13,000 210725 1 SUNAMBR 33 H LET * 20,000 210725 1 SUNAMBR 5,63 D LET * 30,000 210725 1 SUNAMBR 5,63 D LET * 25,000 210725 1 SUNAMBR 96 H LET * 25,000 210725 1 SUNAMBR 96 H LC50 6874 312365 NR 24 H LC50 6,981 312365 NR 48 H LC50 6,981 312365 NR 48 H LC50 618.6 312365 NR 48 H LC50 2,325 312365 NR 48 H LC50 2,325 312365 NR 24 H LC50 2,325 312365 NR 24 H LC50 3.325 312365 NR<		Corbicula fluminea: Asiatic clam	ADULT 5 CM	1D	RSD		0.3	312002	9 S
2 SUNMERS 84 H LBT * 25,000 210725 1 SUNMER 5.63 D MOR * 13,000 210725 1 SUNMER 3.3 H LBT * 30,000 210725 1 SUNMER 5.63 D LBT * 30,000 210725 1 SUNMER 14 H LBT * 50,000 210725 1 SUNMER 96 H LET * 50,000 210725 1 SUNMER 96 H LC ₅₀ 6,981 312365 NR 24 H LC ₅₀ 6,981 312365 NR 48 H LC ₅₀ 6,981 312365 NR 96 H LC ₅₀ 6,981 312365 NR 48 H LC ₅₀ 83 312365 NR 48 H LC ₅₀ 83 312365 NR 48 H LC ₅₀ 618.6 312365 NR 48 H LC ₅₀ 2,325 312365 NR 48 H LC ₅₀ 3,325 310329 N	2 SUMMERS 84 H LBT* 25,000 210725 1 SUMMER 5,63 D LBT* 20,000 210725 1 SUMMER 3,63 D LBT* 30,000 210725 1 SUMMER 5,63 D LBT* 30,000 210725 1 SUMMER 5,63 D LBT* 50,000 210725 1 SUMMER 96 H LBT* 50,000 210725 1 SUMMER 96 H LBT* 50,000 210725 1 SUMMER 96 H LC50 6,981 312365 NR 48 H LC50 6,981 312365 NR 96 H LC50 3,020 312365 NR 96 H LC50 3,020 312365 NR 48 H LC50 83 312365 NR 48 H LC50 2,325 312365 NR 24 H LC50 2,325 312365 NR 24 H LC50 3.325 312365 NR		Coregonis clineaformis: Lake whitefish	26.63 G	72 D	BCF *		0.00125	210688	68
1SUMMER 5.63 D LBT* 20,000 210725 1SUMMER 7D MOR* 13,000 210725 1SUMMER 33 H LBT* 30,000 210725 1SUMMER 5.63 D LBT* 50,000 210725 1SUMMER 14 H LBT* 50,000 210725 1SUMMER 96 H LC50 6,87.4 312365 NR 24 H LC50 6,87.4 312365 NR 48 H LC50 3,920 312365 NR 96 H LC50 83 312365 NR 96 H LC50 6,881 312365 NR 96 H LC50 6,881 312365 NR 96 H LC50 83 312365 NR 48 H LC50 618.6 312365 NR 24 H LC50 3,325 312365 NR 24 H LC50 3,325 310329 NR 48 H <t< td=""><td>1SUMMER 5.63 D LBT* 20,000 210725 1SUMMER 7D MOR* 13,000 210725 1SUMMER 33 H LBT* 30,000 210725 1SUMMER 5.63 D LBT* 50,000 210725 1SUMMER 96 H LBT* 50,000 210725 1SUMMER 96 H LBT* 50,000 210725 NR 24 H LC50 6874 312365 NR 48 H LC50 6,981 312365 NR 48 H LC50 618.6 312365 NR 48 H LC50 618.6 312365 NR 24 H LC50 618.6 312365 NR 48 H LC50 2.325 312365 NR 24 H LC50 3.325 312365 NR 24 H LC50 3.325 312365 NR 24 H LC50 3.325 312365 NR 24 H</td><td></td><td>Carmidae: Minnow carn family</td><td>2 SUMMERS</td><td>84 H</td><td>* TET</td><td>25,000</td><td></td><td>210725</td><td>57</td></t<>	1SUMMER 5.63 D LBT* 20,000 210725 1SUMMER 7D MOR* 13,000 210725 1SUMMER 33 H LBT* 30,000 210725 1SUMMER 5.63 D LBT* 50,000 210725 1SUMMER 96 H LBT* 50,000 210725 1SUMMER 96 H LBT* 50,000 210725 NR 24 H LC50 6874 312365 NR 48 H LC50 6,981 312365 NR 48 H LC50 618.6 312365 NR 48 H LC50 618.6 312365 NR 24 H LC50 618.6 312365 NR 48 H LC50 2.325 312365 NR 24 H LC50 3.325 312365 NR 24 H LC50 3.325 312365 NR 24 H LC50 3.325 312365 NR 24 H		Carmidae: Minnow carn family	2 SUMMERS	84 H	* TET	25,000		210725	57
1SUMMER 7D MOR* 13,000 210725 1SUMMER 33 H LET * 30,000 210725 1SUMMER 5,63D LET * 50,000 210725 1SUMMER 14 H LET * 50,000 210725 1SUMMER 96 H LET * 50,000 210725 1SUMMER 96 H LET * 50,000 210725 NR 24 H LE30 6874 312365 NR 48 H LC50 6,981 312365 NR 96 H LC50 3,020 312365 NR 96 H LC50 6,981 312365 NR 48 H LC50 618.6 312365 NR 48 H LC50 618.6 312365 NR 24 H LC50 1,585 312365 NR 24 H LC50 1,585 310329 127 33 310329 310329	1SUMMER 7D MOR * 13,000 210725 1SUMMER 33 H LET * 30,000 210725 1SUMMER 5,63 D LET * 50,000 210725 1SUMMER 14 H LET * 50,000 210725 1SUMMER 96 H LET * 50,000 210725 NR 24 H LC50 687.4 312365 NR 48 H LC50 6,981 312365 NR 96 H LC50 6,981 312365 NR 96 H LC50 6,981 312365 NR 48 H LC50 618.6 312365 NR 24 H LC50 618.6 312365 NR 48 H LC50 2.325 312365 NR 24 H LC50 2.325 312365 NR 48 H LC50 3.325 312365 NR 48 H LC50 3.3 310929		Continidae: Minnow carn family	1 SUMMER	5,63 D	LET.	20,000		210725	57
1SUMMER 33 H LBT * 30,000 210725 1SUMMER 5.63 D LBT * 30,000 210725 1SUMMER 5.63 D LBT * 50,000 210725 1SUMMER 96 H LBT * 25,000 210725 1SUMMER 96 H LC ₅ 0 687.4 312365 NR 48 H LC ₅ 0 6,981 312365 NR 96 H LC ₅ 0 6,981 312365 NR 96 H LC ₅ 0 83 312365 NR 48 H LC ₅ 0 618.6 312365 NR 24 H LC ₅ 0 618.6 312365 NR 24 H LC ₅ 0 618.6 312365 NR 24 H LC ₅ 0 1.585 312365 NR 48 H LC ₅ 0 1.585 310329 NR 48 H LC ₅ 0 1.585 310329	1SUMMER 33 H LBT * 30,000 210725 1 SUMMER 5.63 D LBT * 5.000 210725 1 SUMMER 14 H LBT * 5.000 210725 1 SUMMER 96 H LET * 5.000 210725 1 SUMMER 96 H LC ₅ 0 687.4 312365 NR 24 H LC ₅ 0 6,981 312365 NR 48 H LC ₅ 0 6,981 312365 NR 48 H LC ₅ 0 6,18.6 312365 NR 12 H LC ₅ 0 618.6 312365 NR 24 H LC ₅ 0 618.6 312365 NR 24 H LC ₅ 0 2,325 312365 NR 24 H LC ₅ 0 2,325 312365 NR 48 H LC ₅ 0 3.32 310929		Continidae: Minnow carn family	1 SUMMER	7.0	MOR *	13,000		210725	57
1 SUMMER 5.63 D LBT * 15,000 210725 1 SUMMER 14 H LBT * 50,000 210725 1 SUMMER 96 H LBT * 25,000 210725 1 SUMMER 96 H LC ₅ 0 687.4 312365 NR 48 H LC ₅ 0 6,981 312365 NR 96 H LC ₅ 0 6,981 312365 NR 96 H LC ₅ 0 83 312365 NR 48 H LC ₅ 0 618.6 312365 NR 24 H LC ₅ 0 618.6 312365 NR 24 H LC ₅ 0 618.6 312365 NR 24 H LC ₅ 0 618.6 312365 NR 24 H LC ₅ 0 1,585 312365 NR 24 H LC ₅ 0 1,585 310329	1 SUMMER 5.63 D LHT * 15,000 210725 1 SUMMER 14 H LET * 50,000 210725 1 SUMMER 96 H LET * 50,000 210725 1 SUMMER 96 H LE50 6874 312365 NR 24 H LC50 6,981 312365 NR 12 H LC50 3,020 312365 NR 96 H LC50 83 312365 NR 48 H LC50 618.6 312365 NR 12 H LC50 618.6 312365 NR 24 H LC50 2,325 312365 NR 24 H LC50 3.325 312365 NR 24 H LC50 3.325 312365 NR 48 H LC50 3.325 312365		Cynrinidae: Minnow, carp family	1 SUMMER	33 H	LET *	30,000		210725	57
1 SUMMER 14 H LBT * 50,000 210725 1 SUMMER 96 H LBT * 25,000 210725 1 SUMMER 96 H LC ₅ 0 687.4 312365 NR 24 H LC ₅ 0 6,981 312365 NR 48 H LC ₅ 0 3,020 312365 NR 96 H LC ₅ 0 83 312365 NR 48 H LC ₅ 0 83 312365 NR 12 H LC ₅ 0 618.6 312365 NR 12 H LC ₅ 0 2,325 312365 NR 24 H LC ₅ 0 1,585 312365 NR 24 H LC ₅ 0 1,585 312365	1 SUMMER 14 H LBT * $50,000$ 210725 1 SUMMER 96 H LBT * $25,000$ 210725 1 SUMMER 96 H LBT * $25,000$ 210725 1 NR 24 H LC ₅₀ $6,81$ 312365 NR 48 H LC ₅₀ $6,981$ 312365 NR 48 H LC ₅₀ 83 312365 NR 48 H LC ₅₀ 6186 312365 NR 24 H LC ₅₀ $2,325$ 312365 NR 48 H LC ₅₀ $2,325$ 312365 NR 48 H LC ₅₀ $2,325$ 312365 NR 48 H LC ₅₀ 33 310929		Continidae: Minnow carn family	1 SUMMER	5.63 D	LET *	15,000		210725	55
1SUMMER 96 H LET* 25,000 210725 NR 96 H LC50 6874 312365 NR 24 H LC50 6,981 312365 NR 48 H LC50 3,020 312365 NR 96 H LC50 12,660 312365 NR 48 H LC50 618.6 312365 NR 24 H LC50 618.6 312365 NR 24 H LC50 618.6 312365 NR 24 H LC50 1,585 312365 NR 24 H LC50 1,585 310329	1SUMMER 96 H LET * 25,000 210725 NR 96 H LC ₅₀ 687.4 312365 NR 24 H LC ₅₀ 6,981 312365 NR 48 H LC ₅₀ 3,020 312365 NR 96 H LC ₅₀ 3,020 312365 NR 48 H LC ₅₀ 618.6 312365 NR 12 H LC ₅₀ 618.6 312365 NR 24 H LC ₅₀ 618.6 312365 NR 24 H LC ₅₀ 5.325 312365 NR 48 H LC ₅₀ 3.325 312365 NR 48 H LC ₅₀ 3.35 310929		Chrimidae: Minow cam family	1 SUMMER	14 H	TEL *	20,000		210725	57
NR 96 H LC ₅₀ 687.4 312365 NR 24 H LC ₅₀ 6,981 312365 NR 48 H LC ₅₀ 3,020 312365 NR 96 H LC ₅₀ 12,660 312365 NR 96 H LC ₅₀ 83 312365 NR 48 H LC ₅₀ 618.6 312365 NR 24 H LC ₅₀ 1,585 312365 NR 48 H LC ₅₀ 1,585 310329	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$		Christae, Minch cam family	1 STAMBE	H 96	LET *	25,000		210725	57
AR 24H LC50 6,981 312365 NR 48H LC50 3,020 312365 AR LC50 12,660 312365 AR LC50 83 312365 AR LC50 618,6 312365 AR LC50 2,325 312365 AR LC50 1,585 312365 AR LC50 1,585 310329	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$		Cypinidac, Miniow, carp mini	a N	H 96	LC,	687.4		312365	88
NR 48 H LC ₅₀ 3,020 312365 NR 12 H LC ₅₀ 1,060 312365 NR 96 H LC ₅₀ 83 312365 NR 48 H LC ₅₀ 618.6 312365 NR 12 H LC ₅₀ 618.6 312365 NR 12 H LC ₅₀ 2,325 312365 NR 24 LC ₅₀ 1,585 310329	NR NR 12H LC ₅ 0 3,020 312365 NR 12H LC ₅ 0 12,660 312365 NR 64H LC ₅ 0 618.6 312365 NR 12H LC ₅ 0 618.6 312365 NR 24H LC ₅ 0 618.6 312365 NR 12H LC ₅ 0 618.6 312365 NR 12H LC ₅ 0 3,325 312365 SH 1,585 312365		Cypils sucknows, Ostracod		24 H	LÇ	6,981		312365	88
NR 12H LC ₂₀ 12,660 312365 NR 96H LC ₂₀ 83 312365 NR 48H LC ₂₀ 618.6 312365 NR 12H LC ₂₀ 618.6 312365 NR 12H LC ₂₀ 1,385 310329	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$		Cypins sucknoon, Ostracon		48 H	LC	3,020		312365	88
NR 96 H LC ₅₀ 83 312365 NR 12H LC ₅₀ 618.6 312365 NR 24H LC ₅₀ 5.325 312365 NR 24H LC ₅₀ 1.585 312365 NR 24H LC ₅₀ 1.585 310329 1	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$		Cypits subgrouss, Ostracod		12 H	LC	12,660		312365	88
NR 48 H LC ₅₀ 618.6 312365 NR 12 H LC ₅₀ 2,325 312365 NR 24 H LC ₅₀ 1,585 312365 NR 48 H LC ₅₀ 3,33 310929	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$		Cypris subglobosa; Ostracou	an an	H 96	LCs	83		312365	88
NR 12H LC50 2,325 312365 NR 24H LC50 1,585 312365 ARTH LC50 1,585 310329	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$		Daphnia lumholzi; Water Ilea	NN Nn	13 X	0°-1	618.6		312365	88
NR 24H LC2 1,585 312365	NR 24H LC_{50} 1,585 312365 $<=24H$ $+68H$		Daphnia lumholzi; Water Ilea	ND	12 H	PC-1	2.325		312365	88
N	~ 10929		Daphnia lumholzi; Water Ilea	NR M	1177	065 1 	1.585		312365	88
	05-77 U.S. 4747=>		Daphnia lumholzi; Water flea		II 67	1 73	33		310929	84

Table O.1–9 AQUIRE Freshwater Toxicity Information (μ g/L) AOC 57

Remedial Investigation Report Devens, Massachusetts

Chemical Name

Cadmium (cont.)

Species Appeig Tape and processes Effect Effect ACTIONS	_		•		Effect	AQUIRE	Year
Column	Species	Age	Exposure	Effect	Concentration	Reference	ç
Color Colo	4	9	J. J. J.		_	Number	Pub
N. C. A.H. A	Daphnia magna; Water flea	< 24 H	21 D	REP *			85
NR 39W MOR* 775	Daphnia magna; Water flea	< 24 H	14 D	OT.			
N. N. N. N. N. N. N. N. N. N. N. N. N.	Daphnia magna; Water flea	NR	3 W.K	MOR.	7.78	210772	89
Color Colo	Japhnia magna; Water flea	NR	3 W.K	MOR *	22.9	210772	89
4.24H 21D LC _G 114 A.24H 21D MOR 3.5 A.24H 21D MOR 3.5 A.24H 21D MOR 3.5 A.24H 21D MOR 3.5 A.24H 48H LC _G 3.6 A.24H 48H LC _G 3.6 A.24H 48H LC _G 3.6 A.24H 48H LC _G 3.6 A.24H 48H LC _G 3.6 A.24H 21D MOR 1.8 A.24H 21D MOR 1.8 A.24H 21D MOR 1.8 A.24H 21D MOR 1.8 A.24H 21D MOR 1.8 A.24H 21D MOR 1.8 A.24H 21D MOR 1.0 A.24H 21D MOR 1.0 A.24H 22D MOR 1.0 A.24H	Japhnia magna; Water flea	<= 24 H	48 H	LC3	62	310929	84
Color Colo	Japhnia magna; Water flea	< 24 H	21 D	LC30	14	310589	85
Color Colo	Japhnia magna; Water flea	< 24 H	. 48 H	LC50	118	311181	84
NEW STATE NOR STATE NOR STATE NOR STATE NOR STATE NOR STATE NOR STATE NOR STATE NOR STATE	Japhnia magna; Water flea	< 24 H	21 D	TEL	5.6	310589	85
NR	daphnia magna; Water flea	< 24 H	21 D	MOR *	3.2	310589	
NR NR NR NR NR NR NR NR	Daphnia magna; Water flea	NR	3 W.K	REP .	11		89
A = 24 H 48 H LC20 40 A = 24 H 48 H LC20 36 A = 24 H 48 H LC20 36 A = 24 H 48 H LC20 36 A = 24 H 48 H LC20 36 A = 24 H 21D MOR* 18 A = 24 H 21D MOR* 18 A = 24 H 21D MOR* 18 A = 24 H 21D MOR* 18 A = 24 H 21D MOR* 18 A = 24 H 21D MOR* 18 A = 24 H LC20 5500 B = 100M 24 H LC20 5500 B = 100M 48 H LC20 5500 B = 100M 64 H LC20 5500 B = 100M 64 H LC20 5500 B = 100M 65 H CC20 5500 B = 100M 65 H CC30 5700 B = 100M 65 H CC30 5700<	Japhnia magna; Water flea	NR	28 D	MOR *			
a c = 24 H 48 H LC00 36 a c = 24 H 48 H LC00 36 c = 24 H 48 H LC00 36 c = 24 H 14 D MOR* 18 c = 24 H 14 D MOR* 18 c = 24 H 14 D MOR* 1 a a c > 24 H 12 D MOR* 1 a a c > 24 H 12 D MOR* 1 a a C > 24 H 23 D LC0 36 N R SHOOTS 10 D MOR* 1 10 D seed 8 - 10 MA 48 H LC30 65 to 60 65 to 60 seed 8 - 10 MA 48 H LC30 13 to 00 65 to 60 65 to 60 seed 8 - 10 MA 48 H LC30 65 to 60 65 to 60 65 to 60 seed 8 - 10 MA 48 H LC30 13 to 60 67 to 60 67 to 60 seed 10 MA 10 MA 10 MA 10 MA	Japhnia magna; Water flea	24	48 H	LÇî	40	310929	
Color Colo	Japhnia magna: Water flea	<= 24 H	48 H		36	310929	
Color Colo	Japhnia magna: Water flea	<= 24 H	48 H		2.5	310929	
A	Janhuis mama: Water fles	≥= 24 H	187 18 H	100	;	310020	
N. N. N. N. N. N. N. N. N. N. N. N. N.	Janhija mama: Water flea	7.4 H	: : : : : : : : : : : : : : : : : : :	% a C X	8,	2105016	
A	apinia magna, water nea	11 t 7 /	G 17	MOM	1.6	510,00	
a < 2.4H 14 D MCBT 32 a < 2.4H	apinia magna; water ilea	Y	797	MOK:	-•		
A	laphnia magna; Water Ilea	H 47 >	14.D	KEP.			82
a C 24 H 21D GRO* 6.24 a C 24 H 21D GRO* 6.32 a.n. flatworm NR 48 H LC50 2.20 6.510.60 y 8 - 10MM 96 H LC50* 5.400 6.510.60 6.510.60 y 8 - 10MM 96 H LC50* 6.1000 6.510.60 6.510.60 y 8 - 10MM 96 H LC50* 6.1000 6.510.60 6.510.60 y 8 - 10MM 96 H LC50* 6.1000 6.00.235 6.00.025 y 8 - 10MM 96 H LC50* 6.1000 6.00.225 6.00.025 y 8 - 10MM 48 H LC50* 6.00 6.00 6.00 y 9 - 10KG 6WK MOR* 1.40 1.20 1.20 y 0 - 1WK 6WK MOR* 1.00 1.00 1.00 1.00 y 0 - 1WK 6WK 6WK MOR 1.00 1.00	aphnia magna; Water flea	< 24 H	21 D	MOR .			
a NR 2B D LBT 5 an. flatworm NR 29 H LC ₂ 0 65 weed 8-10MM 96 H LC ₂ 0 2.250 8-10MM 96 H LC ₂ 0 3.400 8-10MM 96 H LC ₂ 0 13.000 8-10MM 48 H LC ₂ 0 13.000 8-10MM 48 H LC ₂ 0 13.000 8-10MM 48 H LC ₂ 0 13.000 8-10MM 48 H LC ₂ 0 13.000 8-10MM 48 H LC ₂ 0 13.00 8-10MM 48 H LC ₂ 0 13.00 90 H WR MOR* 6.70 40.1 10 H WR MOR* 6.70 40.1 10 H WR MOR* 1.49 2.23 10 H WR MOR* 1.49 2.20 10 H WR MOR* 1.49 2.20 10 H WR 1.49 1.50 1.40	aphnia magna; Water flea	< 24 H	21 D	GRO •	·o		
A	daphnia magna; Water flea	NR	28 D	LET	×	312770	
an, flatworm NR 96 H LC ₂₀ 250 2.250 eveed 8-10MM 09 WK RSD 2.250 7 8-10MM 94 H LC ₂₀ 24 H 34.00 0.51.06.0 8-10MM 94 H LC ₂₀ 34 H 12.00 13.00 8-10MM 94 H LC ₂₀ 	aphnia pulex: Water flea	< 24 H	48 H	LC	89	311181	
Second Stroots Stroots	proesia tiorina. Turbellarian flatworm	82	Н 96	15 1 1 2 1	2.250	218700	
S	lodea canadensis. Waterweed	SHOOTS	10 0 WK	BSD •			
S	nhemerella ionita. Maufly	8-10MM	74 H	* 01			
S	photocon them to Marilla	8-10MA	11 30	0.50 1.00 1.00 1.00 1.00 1.00 1.00 1.00	13 000	212041	
S = 10 MAM	phenicical ignita, Mayin	MAIN OF THE STATE	U 06	.050	13,000	312041	
S	pinemerena ignita; iwayiiy		H #7	1050 ·	91.00	312041	82
No. S	pnemerena ignita; mayiny	S - IUMIM	H 84	LC50.	19,000	312041	
No. Sc. Cont. Cont. Cont. Cont. Cont. Cont.	pnemerella ignita; Mayliy	8-10 MM	H 95	LCso	12,000	312041	85
S0-160G 10.11 WK RSD 6010.225 0-1 WK 6 WK MOR* 6.700 3.42 0-1 WK 6 WK MOR* 2.23 3.42 0-1 WK 6 WK MOR* 2.23 3.42 0-1 WK 6 WK MOR* 1.49 2.23 0-1 WK 6 WK MOR* 1.49 2.23 NR 8-12 MM 56 H LC ₅₀ * 1.300 2.23 8-12 MM 96 H LC ₅₀ * 1.300 2.23 8-12 MM 48 H LC ₅₀ * 4.00 4.00 8-12 MM 48 H LC ₅₀ * 4.00 4.00 8-12 MM 48 H LC ₅₀ * 4.00 2.500 NR 7D LET 4.00 2.500 sclass NR 7D LET 4.00 NR 70G 110.60D RNZ 0.57 0-1 WK 6WK MOR* 0.92 0-1 WK 6WK MOR* <t< td=""><td>phemerella ignita; mayiiy</td><td>8 - 10 MM</td><td>48 H</td><td>•05) T</td><td></td><td></td><td></td></t<>	phemerella ignita; mayiiy	8 - 10 MM	48 H	•05) T			
offsh NR 48 H MOR * 6,700 0-1 WK 6 WK MOR * 2.23 3.42 0-1 WK 6 WK MOR * 1.49 2.23 0-1 WK 6 WK MOR * 1.49 2.23 NR 96 H LC ₅₀ * 1.300 2.23 8-12 MM 96 H LC ₅₀ * 3.0 3.0 8-12 MM 96 H LC ₅₀ * 3.0 3.0 8-12 MM 96 H LC ₅₀ * 3.0 3.0 8-12 MM 48 H LC ₅₀ * 4.00 4.00 8-12 MM 48 H LC ₅₀ * 4.00 4.00 8-12 MM 48 H LC ₅₀ * 4.00 4.00 NR NR 1.00 D RSD 2.500 2.500 8-12 MM NR 1.00 D RSD 4.00 2.500 8-12 MM NR 1.00 D RSD 2.00 2.500 8 class NR 1.00 D RSD 6.200 </td <td>sox lucius; Northern pike</td> <td>50-160 G</td> <td>to 11 WK</td> <td>RSD</td> <td></td> <td></td> <td></td>	sox lucius; Northern pike	50-160 G	to 11 WK	RSD			
0-1 WK 6 WK GRO* 3.42 0-1 WK 6 WK GRO* 2.23 0-1 WK 6 WK MOR* 2.23 0-1 WK 6 WK MOR* 1.49 2.23 0-1 WK 6 WK MOR* 1.40 2.23 NR 24 H LC ₅₀ * 1.300 2.0 8-12 MM 96 H LC ₅₀ * 3.0 3.0 8-12 MM 24 H LC ₅₀ * 3.0 4.0 8-12 MM 48 H LC ₅₀ * 4.0 4.0 8-12 MM 48 H LC ₅₀ * 4.0 4.0 8-12 MM 48 H LC ₅₀ * 4.0 4.0 8-12 MM 48 H LC ₅₀ * 4.0 4.0 8-12 MM NR NR 1.0 4.0 1.0 8-12 MM NR NR 1.0 4.0 1.0 8 class NR NR NR 4.0 1.0 8 class NR NR 0	rambusia affinis; Mosquitofish	NR	48 H	MOR.			
0-1 WK 6 WK MOR * 2.23 0-1 WK 6 WK MOR * 1.49 0-1 WK 6 WK MOR * 1.49 NR 96 H LC ₅₀ * 40.1 8-12 MM 96 H LC ₅₀ * 20 8-12 MM 96 H LC ₅₀ * 30 8-12 MM 48 H LC ₅₀ * 400 8-12 MM 48 H LC ₅₀ * 400 8-12 MM 48 H LC ₅₀ * 400 NR 7D LET 400 NR 7D RSD 2500 NR 210D RSD 2500 YEARLING.NYMPHS. 24 MM 96 H LC ₅₀ * 6,200 VG 110 60D ENZ * 0,57 0-1 WK 6 WK MOR * 0,92 0-1 WK 6 WK MOR * 0,92	ammarus fasciatus; Scud	0-1 WK	6 WK	GRO *			
0-1 WK GW GRO* 2.23 0-1 WK 6 WK MOR* 1.49 2.23 NR 96 H LC ₅₀ * 40.1 2.300 8-12 MM 96 H LC ₅₀ * 20 20 8-12 MM 96 H LC ₅₀ * 20 20 8-12 MM 48 H LC ₅₀ * 400 400 8-12 MM 48 H LC ₅₀ * 400 2.500 NR 7D LET 400 2.500 NR 100 D RSD 2.500 NR 210 D RSD 2.500 NR 10 60 D ENZ 260 YEARLING.NYMPHS.24 MM 96 H LC ₅₀ * 6.200 VB 10 60 D ENZ 0.57 0-1 WK 6 WK MOR* 0.95 0-1 WK 6 WK MOR* 0.92	ammarus fasciatus; Scud	0-1 WK	6 WK	MOR.			
0-1 WK MOR * 1.49 NR 96 H LC50 40.1 8-12 MM 96 H LC50 20 8-12 MM 96 H LC50 30 8-12 MM 24 H LC50 1.660 8-12 MM 48 H LC50 400 8-12 MM 48 H LC50 400 NR 7D LET 400 NR 10 D RSD 2.500 NR 10 D RSD 2.500 NR 10 D RSD 2.500 YEARLING.NYMPHS. 24 MM 96 H LC50 6.200 YEARLING.NYMPHS. 24 MM 96 H LC50 6.200 O-1 WK 6 WK MOR* 0.92 0-1 WK 6 WK MOR* 0.92	ammarus fasciatus; Scud	0-1 WK	6 WK	GRO *	.2		
NR 96 H LC ₅₀ 40.1 8-12 MM 24 H LC ₅₀ 1.300 8-12 MM 96 H LC ₅₀ 20 8-12 MM 24 H LC ₅₀ 400 8-12 MM 48 H LC ₅₀ 400 8-12 MM 48 H LC ₅₀ 400 NR 7D LET 400 NR 210D RSD 2,500 NR 110 60D RSD 2,500 YEARLING, NYMPHS, 24 MM 96 H LC ₅₀ 6,200 VG 10-1 WK 6 WK MOR * 0,57 0-1 WK 6 WK MOR * 0,92 2,23	ammarus fasciatus; Scud	0-1 WK	6 WK	MOR *	1.49	210772	89
8-12 MM 24 H LC50 1,300 8-12 MM 96 H LC50 20 8-12 MM 96 H LC50 30 8-12 MM 24 H LC50 400 8-12 MM 48 H LC50 400 8-12 MM 48 H LC50 400 NR 7D LET 400 NR 210 D RSD 2,500 NR 110 60 D RNZ 20 VEARLING.NYMPHS. 24 MM 96 H LC50 6,200 VEARLING.NYMPHS. 24 MM 96 H LC50 6,200 0-1 WK 6 WK MOR* 0,57 0-1 WK 6 WK MOR* 0,92 0-1 WK 6 WK MOR* 0,92	iammarus lacustris; Scud	NR	H 96	LÇ	40.1	313058	
8-12 MM 8 -12 MM 9 -12 MM 9 -12 MM 9 -12 MM 9 -12 MM 9 -12 MM 9 -12 MM 9 -12 MM 9 -12 MM 9 -12 MM 9 -12 MM 9 -12 MM 9 -12 MM 9 -12 MM 9 -13 MM 9 MM 9 MM 9 MM 9 MM 9 MM 9 MM 9 MM	ammarus pulex; Scud	8-12 MM	24 H	LC ₅₀	1,300	312041	85
8 - 12 MM 96 H LC50* 30 8 - 12 MM 24 H LC50* 1,600 8 - 12 MM 48 H LC50* 400 8 - 12 MM 48 H LC50* 400 NR 7 D LET 400 NR 1010 D RSD 2,500 NR 110 d0 D RND 2,500 YEARLING.NYMPHS. 24 MM 96 H LC50 6,200 0-1 WK 6 WK MOR* 0,57 0-1 WK 6 WK MOR* 0,92 0-1 WK 6 WK MOR* 0,92	ammarus pulex; Scud	8-12 MM	H 96	LC ₅₀ *	20	312041	85
8-12MM 24H LC50* 1,600 8-12MM 48 H LC50* 400 8-12MM 48 H LC50* 400 NR 7 D LET 400 NR 1010 D RSD* 2,500 NR 1000 D RSD* 2,500 YEARLING, NYMPHS, 24 MM 96 H LC50 6,200 O-1 WK 6 WK MOR* 0,57 0-1 WK 6 WK MOR* 0,92 0-1 WK 6 WK GRO* 2,23	ammarus pulex; Scud	8-12 MM	H 96	LC ₅₀ *	30	312041	
8-12MM 48 H LC ₅₀ * 400 8-12MM 48 H LC ₅₀ * 400 NR 7D LET 400 0.3-0.6 G to 10D RSD 2,500 NR 210D RSD * 2 70G 1to 60D ENZ * 6,200 YEARLING, NYMPHS, 24 MM 96 H LC ₅₀ 6,200 0-1 WK 6 WK MOR * 0,57 0-1 WK 6 WK MOR * 0,92 0-1 WK 6 WK GRO * 2.23	rammarus pulex; Scud	8-12 MM	24 H	LC ₅₀ •	1,600	312041	
8-12MM 48 H LC ₅₀ * 400 NR 7D IET 400 2,500 0.3-0.6 G to 10 D RSD 2,500 2,500 NR 210 D RSD 2,500 2,500 YEARLING, NYMPHS, 24 MM 96 H LC ₅₀ 6,200 260 0-1 WK 6 WK MOR* 0,57 0,57 0-1 WK 6 WK MOR* 0,92 2.23	fammarus pulex; Scud	8-12 MM	48 H	LCto	400	312041	85
NR 7D LET 400 0.3-0.6G to 10D RSD 2,500 NR 210D RSD 2 70G 110 60D ENZ 2 YEARLING.NYMPHS.24 MM 96 H LC50 6,200 0-1 WK 6 WK MOR 0,57 0-1 WK 6 WK MOR 0,92 0-1 WK 6 WK GRO 2,23	'ammarus pulex; Scud	8-12 MM	48 H	i C	400	312041	
0.3-0.6 G to 10 D RSD 2.500 NR 210 D RSD 2.500 700 TO 0.0 ENZ 7 2.500 YEARLING.NYMPHS. 24 MM 96 H LC ₅ 0 6.200 0-1 WK 6 WK MOR 0.57 0-1 WK 6 WK MOR 0.52 0-1 WK 6 WK 2.23	ammarus roeseli; Scud	NR	7.D	TEL	400	210725	57
NR 210 D RSD • 2 70G 110 60 D ENZ • 260 YFARLING, NYMPHS, 24 MM 96 H LC ₅₀ 6,200 0-1 WK 6 WK MOR • 0.57 0-1 WK 6 WK MOR • 0.92 0-1 WK 6 WK GRO • 2.23	asterosteus aculeatus; Three spine stickleback	0.3-0.6 G	to 10 D	RSD	2,5		
To G	rastropoda; Snails, limpets class	NR	210 D	RSD *			73
YEARLING.NYMPHS.24MM 96 H LC ₅₀ 6,200 0−1 WK 6 WK MOR • 0.57 0−1 WK 6 WK MOR • 0.92 0−1 WK 6 WK GRO • 2.23	Jeteropneustes fossilis; Indian catfish	70 <i>G</i>	1 to 60 D	ENZ •	2		82
0-1WK 6 WK MOR • 0.57 0-1WK 6 WK MOR • 0.92 0-1WK 6 WK GRO • 2.23	Jexagenia rigida; Mayfly	YEARLING, NYMPHS, 24 MM	H 96	LC30	6,200	212091	80
0-1WK 6WK MOR* 0.92 0-1WK 6WK GRO* 2.23	Jyalella azteca; Scud	0-1 WK	6 WK	MOR.	0.57	210772	89
0-1WK GRO • 2.23	Hyalella azteca; Scud	0-1 WK	6 W.K	MOR *	0.92	21072	
	Iyalella azteca; Scud	0-1 WK	6 WK	GRO •			
					ı		



Table O.1–9 AQUIRE Freshwater Toxicity Information (μg/L) AOC 57

Remedial Investigation Report Devens, Massachusetts

Chemical Name

Cadmium (cont.)

	Devens, Massachusetts			5		T. Canada	
Species	98	Exposure	Effect	Concentration	ion	AQUIKE Reference	of
	Ċ			Lethal	Sublethal	Number	Publication
Hydrodictyon reticulatum: Green algae	NR	1 to 168 H	BMS		100 to 10000	213348	89
Hydronswhe an mistinennis: Caddisfly	10-15 MM	H 96	rc.,•	520,000		312041	85
Hydronsyche angustinennis: Caddisfly	10-15 MM	24 H	ron To	200,000		312041	85
Hydropsyche angustipennis; Caddisfly	10-15MM	48 H	LC ₃	200,000		312041	85
Hydropsyche angustipennis; Caddisfly	10-15 MM	H 96	LC ₅₀ *	200,000		312041	85
Ictalurus nebulosus; Brown bulihead	NR	24 H	THL *		20	313113	87
Invertebrates; Invertebrates	ZOOPLANKTON	14D	BMS *		ς,	312800	87
Invertebrates; Invertebrates	CLADOCERA, COPEPODA, ROTIFERA	2 WK	POP*		er.	311256	83
Invertebrates; Invertebrates	ZOOPLANKTON	14D	BMS *		1	312800	87
Lamellidens marginalis; Mussel	7 CM	4.2 to 11.3 H	PHY *		500 to 2,000	213311	68
Lamellidens marginalis; Mussel		1 to 30 D	GRO		500 to 2,000	213776	91
Lamellidens marginalis; Mussel	5.0-6.0 CM	1 to 30 D	၁၀	:	500 to 2,000	213776	91
Lamellidens marginalis; Mussel	5.0-6.0 CM	H 96	Γ_{S_0}	10,000		213776	91
Lamellidens marginalis; Mussel	NR	H 96	Γ_{S_0}	10,000	,	213311	68
Lampsilis ventricosa; Lamp—mussel	NR	2 WK	RSD		< 2 to 4.5	312614	87
Lenna minor; Duckweed	20 COLONIES OR 40 FRONDS	4D	$EC_{50}GR$		200	311789	%
Lepomis macrochirus; Bluegill	NR	48 H	ENZ.		,	213021	88
Lepomis macrochirus; Bluegill	NR	14 D	PHY	1	1 to 100	212707	88
Lepomis macrochirus; Bluegill	NR	6 MO	TEL	2,000		212143	73
Limnodrilus hoffmeisteri; Oligochaete	30-40 MM	24 H	•ီင် ဂို	24,000		312041	\$8
Linnodrilus hoffmeisteri; Oligochaete		H 96	*05. C	2,900		312041	\$2
Limnodrilus hoffmeisteri; Oligochaete	30-40 MM	24 H	* 0, 0, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1,	20,000		312041	88
Linnodrilus hoffmeisteri; Oligochaete		48 H	, s	6,400		312041	\$ 3
Linnodrilus hoffmeisteri; Oligochaete	30-40 MM	48 H	*05.	008'9		312041	85
Linnodrilus hoffmeisteri; Oligochaete	30-40 MM	H 96	*	2,400	ş	312041	\$3
Limnodrilus sp; Sludge worm	NR	14D	RSD	,	20	311865	£ 6
Lophopodella carteri; Bryozoa	ANCENSIRULAE 2-3 DAYS	H 96	05°	OCT	č	210/03	00
Macrobrachium hendersodayanus; Frawn	NR	H 06	, S	٧	40	311343	40
Morone saxatilis; Striped bass	LARVAE, 6 WK	H 067	5.50 8.00 8.00 8.00	0 00		310625	Ç è
Morone saxatilis; Striped bass	LARVAE, 1D	11052H	MOK	07 011		310625	C 8
Morone saxaulus, suripeu bass	LANVAE, 1 D	32.0	# CD JE	000	000 008	210020	77
Mynophynum spicatum; Water—munon	4 CM ABRY	32 E	ECSOLK FC. BM *		7.400	212262	74
Mariophymum spicamin, water minion Mariophymu enjostnen: Water milfoil	4 CM APRX	32.D	EC. BM *		14,600	212262	74
Myriophyllum spicatum: Water—milfoil	4 CM APEX	32D	EC.OR *		20,800	212262	74
Noemacheilus barbatulus: Stone loach	5-12G	to 15 WK	RSD		1,250	311872	86
Noemacheilus barbatulus; Stone loach	5-15G	2 to 77 D	RSD *		1,250	312707	87
Noemacheilus barbatulus; Stone loach	2-21G	to 119 D	RSD		3 to 1,250	213451	06
Noemacheilus barbatulus; Stone loach	7-21G	25 WK	BIO		e	219243	06
Notemigonus crysoleucas; Golden shiner	NR	48 H	ENZ *		100	213021	88
Notemigonus crysoleucas; Golden shiner	ADULT, 70-90 MM	12 H	ENZ *		1,350	312205	87
Notemigonus crysoleucas; Golden shiner	ADULT, 70-90 MM	Н9	HEM *		1,350	312205	87
Notemigonus crysoleucas; Golden shiner	NR	H 96	PHY	,	1,350 to 2,400	212707	88
Notemigonus crysoleucas; Golden shiner	ADULT, 70-90 MM	H 96	1. L.C.	3,150		312205	8/
Oncorhynchus mykiss; Kambow trout, donaldson trout	1 SUMMER 150-730G	30 H	ESD *	,000,	0.610.1.13	21012	, c 81
Oncolliplicates mykiss; Kambow Lout, uonatuson Lout	TAKENTE 100	1 W.K	* CISE	·	3.000 to 60 600	312720	22
Oncorbunchus mykies: Rainbow trout, donaldson trout	\$70M.3.1G	48 H	LCeo?			219245	73
Oncorhynchus mykiss: Rambow trout, donaldson trout	PRY.3 CM	48 H	I C	91		210459	80
Oncorhynchus mykiss; Rainbow trout, donaldson trout	NR	2 MO	MOR	18 to 54		312383	83
Oncorhynchus mykiss; Rainbow trout, donaldson trout	5.0 CM, 2.1 G	24 H	LC_{50} ?	4,200		219245	73

Table O.1 –9 AQUIRE Freshwater Toxicity Information (μg/L) AOC 57

Remedial Investigation Report

Cadmium (cont.)

		Devens, Massachusetts	S					
Chemical Name	Species	Aoe	Frmostire	Effect	Bffect		AQUIRE	Year
		i.			Lethal Sut	Sublethal		Publication
nium (cont.)	Oncorhynchus mykiss; Rainbow trout, donaldson trout	1 SUMMBR	7D	MOR *	3,000		210725	57
	Oncorhynchus mykiss; Rainbow trout, donaldson trout	NR	3 MO	BIO		6	312383	83
	Oncorhynchus mykiss; Rambow trout, donaldson trout	5.0 CM, 2.1 G	H 96	LC40	9		219245	73
	Oncorhynchus mykiss; Rambow trout, donaldson trout	9-200G	3 to 133 D	RSD		3 to 15	213451	06
	Oncorhynchus mykiss; Rambow trout, donaldson trout	375G	3D	• YHY •		6.4	310404	84
	Oncorhymchus mykiss; Rambow trout, donaldson trout	1 SUMMER	17 H	LET.	5,000		210725	S
	Oncorhynchus mykiss; Rambow trout, donaldson trout	FRY, 3 CM	48 H	LC_{50}	3,698		210459	80
	Oncorhynchus mykiss; Rambow trout, donaldson trout	FRY, 3 CM	48 H	ΓC_{50}	358		210459	80
	Oncorhynchus mykiss; Rambow trout, donaldson trout	NR	7D	MOR *	8 to 10		310185	89
	Oncorhynchus mykiss; Kambow trout, donaldson trout	36-102G	25 WK	BIO		3	219243	8
	Oncorhynchus mykiss; Rambow trout, donaldson trout	NR	280 D	RSD		0.01 to 4.8	219245	73
	Oncorhynchus mykiss; Rambow trout, donaldson trout	1 SUMMER	21 H	* TET	8,000		210725	57
	Oncornynchus mykiss; Rambow trout, donaidson trout	FRY, 3 CM	48 H	$\Gamma_{S_0}^{C_{S_0}}$	677		210459	80
	Oncornynchus mykiss; Rambow trout, donaidson trout	2 SUMMERS	5.92 D	LET	8,000	•	210725	27
	Oncornynchus mykiss; Kambow trout, donaidson trout	N	12 MO	BIO	•	0	313110	88
	Oncornynchus mykiss; Kambow trout, donaidson trout	5.7 CM, 1.1 G	H 96	Γ_{S_0}	7		219245	73
	Oncorhymetria mykiss; Kambow troat, donaldeen front	3.0 CM, 2.1 G	U01	, C.	α (219245	73
	Organization in Maries Dambow treat donaldeen front	3.7 CM, 1.1 C	J 65	,0501 404	,	1000	219245	6/.
	Opportunities in the same of the contract of t	1 STRAMED	U2/	LET.	000	0.00127	210088	£ (
	Oncorhynchus mykies: Rambow trout, donaldson trout	375G	178 T	• AHd	000.	3.6	210/23	(°
	Oncorhynchus mykie: Rambow tront donaldson trout	50CM 21G	48 H	1111	c	0.0	310404	, o
	Oncorhynchiis mykise: Rambow trout, donaldson trout	EVED EGGS	4 to 756 D	DSD.		0 5 40 7 1	219643	C 6
	Oncorhynchus mykiss: Rambow trout, donaldson trout	1 SIMMER	H &L	• THT	10000	1.7 01 6.7	21/34	× 5
	Oryzias latipes: Medaka, high-eves	FERTILIZED EGGS	1 WK	ABN *	2001	10	310880	6
	Oryzias latipes; Medaka, high - eyes	EGG	NR	HAT	301	30 to 10 000	213213	000
	Oryzias latipes; Medaka, high – eyes	EGG	48 H	RSD	300	300 to 4,500	213212	80
	Pectinatella magnifica; Bryozoa	ANCENSTRULAE 2-3 DAYS	H 96	LCs	700		216703	80
	Physa fontinalis; Bladder snail	10-12MM	H 96	*°571	80		312041	88
	Physa fontinalis; Bladder snail	10-12 MM	48 H	LC	2,100		312041	85
	Physa fontinalis; Bladder snail	10-12MM	24 H	, COT	4,200		312041	85
	Physa fontinalis; Bladder snail	10-12 MM	48 H	ro ¹	1,800		312041	85
	Physa fontinalis; Bladder snail	10-12MM	24 H	LC ₅₀ *	4,400		312041	85
	Physa fontinalis; Bladder snail	10-12MM	H 96	LC30*	80		312041	85
	Physa gyrina; Pouch snail	ADULT	48 H	$^{ m LC_{S0}}$	4,250		212021	76
	Physa gyrina; Pouch snail	JUVENILE	48 H	rcso,	069		212021	76
	rhysa gyrina; Pouch snail	ADULI	228 H	LC ₅₀ ?	830	:	212021	76
	Lilysa gyinia, Fouch silali Dhea gyrina: Douch enail	ADOLI	4 to 60 H	KEY	1,800t	1,800 to 10,000	212021	9 2
	Physa gyrina; Ponch snail	HIVENITE	H 96	11.	1,3/0		212021	e ;
	Physa ogrina: Pouch spail	ADIIIT	11 0/ 11 7/	10.30	7,600		212021	9 %
	Pimephales promelas; Fathead minnow	NR	48 H	ENZ •	0001	-	213021	0 %
	Pimephales promelas; Fathead minnow	NR	48 H	ENZ *		. 5	213021	8
	Plumatella emarginata; Bryozoan	ANCENSTRULAE 2-3 DAYS	H 96	TC	1.090	1	216703	08
	Polycelis tenuis: Turbellarian	10-12 MM	48 H	LC.	125,000		312041	85
	Polycelis tenuis; Turbellarian	10-12 MM	H 96	LC.1	74,000		312041	. X
	Polycelis tenuis; Turbellarian	10-12 MM	H 96	rc ₅₀ *	80,000		312041	85
	Polycelis tenuis; Turbellarian	10-12 MM	24 H	LC ₅₀ *	130,000		312041	85
	Polyceus tenuis; Lurbellarian	10-12 MM	24 H	LC ₅₀	270,000		312041	85
	Polycelis tenuis; 1 Urbellarian	10-12 MM	48 H	*0507 *0507	100,000		312041	85
	rotatilogetal crispus, Curied polluwed	N. Y. Y. Y. Y. Y. Y. Y. Y. Y. Y. Y. Y. Y.	Y V	r _{N2} .		1,000	217552	11



10-Mar-2000

Table O.1–9 AQUIRE Freshwater Toxicity Information (μ g/L) AOC 57

		Devens, Massachusetts					
		4	Duran	T Ffort	Effect	AQUIRE	Year
Chemical Name	Species	780	amender		Lethal Subjethal	Number	Publication
Codminm (cont.)	Drown than to clarkit Red evamp crauffeh	ADITI TINTERMOLT	to 30 D	BIO		212572	68
Cauminin (conc.)	December of the Second of the	ADILL INTERMOLT	H 90	* ZNH	100	312701	87
	Procamoarus ciarkii, Reu swamp crayiisii	ADULT, INTERMOLI	11 20 6 11	# CIA	10,000	215112	6 5
	Procambarus clarkii; Ked swamp crayiish	ADOLI INTERMOLI, 19.3-30.2 G	10.5011	Old	005	211872	8
	Rutilus rutilus; Koach	100 G	140 ZO W.K.	ASD *	30.5	3110707	8, 00
	Kutius rutius; Koach		450	RSD	450	213451	6
	Kutilus rutilus; Koacai	EVERYO	aN	* 085	000 5 04 50 0	218196	× ×
	Salvelnius Ionithians, Dioos tiout	STRACEB	47 H	* TH1	10.000	21075	22
	Salvellius Ionulialis, Drook d'out	1 STRATER	11 % 11 %	* THI	25,000	210725	57
	Salvelmus Iontinalis, Brook float	1 STIMMER	7.7	MOR *	4.000	210725	57
	Salvelmus toniumans; Drook trout	SUMMEN	C / 83	* 111	25,000	210725	57
	Salvelmus fontmalis; Brook front	2 SUMMERS	7.60	* TH1	900	21072	
	Salvelmus Ionumans, Brook trout	SCHALL	4427	* TH1	\$ 000	210725	57
	Salvelinus Ionulialis, Blook tiout	1 STRACES	H 55	*THI	8 000	210725	75
	Salvellius Ionumans, Drook Lout	FMBDVO	a N	HAT*	000 4 4 4 0 0	218196	. «
	Salveimus Iontmalls, Brook trout	ABILIT	30 J	* alls	3 4 4 0 60	312833	8 %
	Salveimus Iontinalis, Brook trout	ADOLI No	J05 4	RIC	25 000 to 50 000	21250	8 &
	Scyllominus canicula; Dogitsh	25 ED CELL CARE I AG BUASE	10 I 00 I	* 454	30	213335) G
	Selenastrum capricornulum; Oreen algae	25 DE CELES/ME, EACH FINASE	11 84	* AHd	30	213335	8
	Scienastrum captroomnum, Otoch algae	25 ES CELESIME, EMO FATASE	17 CH 18 H	10.	26	311181	× ×
	Simocephalus vetulus; water nea	TIPE BOND COLONY	1 F	AHA	100 to 10 000	213264	. 0
	Spirodela polymiza; Large ducaweed	TIMES FROM COLONI	ם <u>ד</u>	and	100 to 1000	733264	80
	Spirodela polymiza; Large ducaweed	I HANDE FROM COLONI	2 12	NOI	2000 5	312317	6 8
	Spirulina piatensis; Biue – green aigae	NB	17.71	ECH BOR	1000	312317	8
	Spirulina platensis; blue—green algae	ME	200	TOG BOB	10,000	317317	98
	Spirulina platensis; Blue – green algae	N. T.	H 47	PCP	000 -	217217	00
	Spirulina platensis; Blue—green algae	N. C. C. C. C. C. C. C. C. C. C. C. C. C.	40 H	TOT BOR	1,000		98
	Spirulina platerisis, blue—green algae	NB	17.71	ECE.	1,000		8 %
	Spirulina platensis; Blue – green algae	NK	30 H	BCB	000 \$	312317	00
	Spirulina platensis; Blue – green algae	NK ***	4 5 H	BCF PCB	3,000	312317	S &
	Spirulina platensis; Blue—green algae	NR:	30 H	BCF	007	312317	8
	Spirulina platensis; Blue – green algae	N.	48 H	BCF	300	512517	00
	Spirulina platensis; Blue – green algae	NR	48 H	BCF	10,000	312317	00
	Spirulina platensis; Blue – green algae	NK	12 H 18 H	BCF	10,000	512517	00
	Spirulina platensis; Blue – green algae	NK	48 H	BCF	001	212217	00 %
	Spirulina platensis; Blue—green algae	N.Y.	30 1	PCB	00%	217217	98
	Spirulina platensis; Blue—green algae	N. M. D. M. M. M. M. M. M. M. M. M. M. M. M. M.	12.H		005	312317	98
	Spirulina plateatsis, blue – green algae	NY CIN	7 7	ECE BOR	1000	312317	8 8
	Spirulina platensis; Blue – green algae	div.	74 H	BCF	5,000		98
	Spirullia platelists, Dide - green algae	1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	74 H	BCF	100		86
	Spirulina platerisis; Dide—green algae Saimina alatamin Dina—green algae	N.S.	12 H	BCF	100	312317	98
	Spirulina piaterisis, Diuce - gi ceri argae Serienlina platentis: Blue - green alme	an a	36 H	BCF	2005	312317	98
	Spirulina piacetais, Diuc – gi con argae	103 SG 100 CM	to 45 D	HEM *	0.0783 to 6.4635	213331	8 8
	Tilapia mossamotoa; Mozamondue mapia	ND CO. 17:5 CM	MW Act	HEM •	100 001	312792	87
	Lilapia mossamorca; Mozamorque mapia	1 STRANGE	# 12	* THI	W 000	210725	15
	Tinca falca; Lencil	1 SOMINES	73 11	* 101	35,000	21017	
	Inca inca; I ench	SUMMER	# C %	TOT!	000 00	21012	5
•	Tinca tinca; Tench	SUMMER	2.00 12	* TA1	70,000	210725	5 5
	Tinca tinca; Tench	2 SUMMERS 1 STRAMED	H 80	IET.	40,000	210725	; E
	Third third; Touch	1 STRANGED	 	* aoM	19 000	210725	2.5
	Inica tutca, I cutti Tribolodon hakonensis: Iananese harbel	4 3 CM 1 1 G	48 H	1.02.7	56 to 100	219245	73
	I ITOMICAL TREMOTERISTS SUPERIOR CONT. CO.	O 117 CAPA (117 CIT	!	.nc. 1) ;	: :	!

Table O.1-9 AQUIRE Freshwater Toxicity Information (μg/L) AOC 57

Remedial Investigation Report Devens, Massachusetts

		Devens, Massachusetts						
Chemical Name	Species	Age	Exposure	Effect	Effect Concentration	ion	AQUIRE Reference	Year
	-		•	1	Lethal	Sublethal		Publication
Cadmium (cont.)	Tribolodon hakonensis; Japanese barbel	4.3 CM, 1.1 G	H 96	LC.	\$6 to 100		219245	73
`	Tubifex sp: Tubificid worm	N.R.	14 D	RSD		20	311865	83
	Tubifex tubifex; Tubificid worm	NR	7 D	LET	5,000		210725	57
Chromium	Aedes aegypti; Mosquito;	LARVAE	48 H	LÇ	12,500		313255	88
	Ceriodaphnia reticulata; Water flea;	< 4 H	48 H	LC	45		311181	84
	Colisa fasciata; Giant gourami;	5.23 G, 5.41 CM, ADULT	24 H	HEM.		48,000	312803	87
	Colisa fasciata; Giant gourami;	NR	2 to 96 H	BIO *		48,000	312719	87
	Cyclops sp; Cyclopoid copepod;	ADULT	48 H	rc30	10,470		313255	88
	Daphnia ambigua; Water slea;	12 H	72 H	EC ₅₀ IM		1,700	218476	76
	Daphnia ambigua; Water flea;	12 H	72 H	EC50IM		7,700	218476	76
	Daphnia galeata; Water flea;	12 H	72 H	EC ₅₀ IM		65,600	218476	76
	Daphnia magna; Water slea;	12 H	72 H	EC ₅₀ IM		42,100	218476	76
	Daphnia magna; Water flea;	12 H	72 H	ECSOIM	L	5,200	218476	92
	Daphnia magna; Water slea;	24-48 HR, NEONATE	21 D	GRO •		S	213950	91
	Daphnia magna; Water slea;	< 24 H	48 H	LC50	22		311181	84
	Daphnia magna; Water flea;	24-48 HR, NEONATE	21 D	MOR	S to 15		213950	91
	Daphnia magna; Water slea;	24-48 HR, NEONATE	21 D	REP *		5	213950	91
	Daphnia pulex; Water flea;	< 24 H	48 H	LC30	48		311181	84
	Daphnia pulex; Water flea;	NR	H 96	Γ_{50}°	90,400		210394	89
	Daphnia pulicaria; Water sea;	12 H	72 H	EC ₅₀ IM		110,800	218476	9/
	Dugesia dorotcephala; Turbellarian, flatworm;	18-20 MM	1 H	BEH •		50 to 500	310581	91
	Dugesia tigrina; Turbellarian, flatwomn;	NR	H 96	ΓC_{50}	2,220		218709	74
	Hydrodictyon reticulatum; Green algae;	NR	1 to 168 H	BMS		100 to 10000	213348	88
	Lenna minor; Duckweed;	20 COLONIES OR 40 FRONDS	4D	ECSOGR		35,000	311789	98
	Lophopodella carteri; Bryozoa;	ANCENSTRULAE, 2-3 D	H 96	LC30	1,560	;	216703	80
	Myriophyllum spicatum; Water—milloil;	4 CM APEX	32 D	EC ₅₀ BM		14,600	212262	47.
	Myriophyllum spicatum; Water-milloll;	4 CM APEX	32D	EC ₅₀ BM •		006,4	212262	4/
	Myriophyllum spicatum; water – milloil;	4 CM APEX	32.0	ECSOCK :		24,400	717707	14
	Myriophyllum spicatum; Water-miltoil;	4 CM APEX	32 D	ECSOGR •		26,000	212262	74
	Mystus vittatus; Catfish;	80-100 MM, 6-10 G	H 96	LC50 ?	200,000		315793	82
	Pectinatella magnifica; Bryozoa;	ANCENSTRULAE, 2-3 D	H 96	LC50	1,440		216703	80
	Pimephales promelas; Fathead minnow;	40-68 MM	48 H	LC.	28,000		210837	75
	Pimephales promelas; Fathead minnow;	40-68 MM	48 H	LC30	61,000		210837	75
	Pimephales promelas; Fathead minnow;	40-68 MM	H 96	LCSO	37,000		210837	7.5
	Pimephales promelas; Fathead minnow;	40-68 MM	H 96	1, L.S.	52,000		210837	75
	Flumatella emargmata, biyozoan; Simocenhalus vetulus: Water flea:	ANCENSI ROLAE. 2=3 D	90 H 48 H	\$	050		311181	08 48
				2030	2		211101	ţ,
Copper	Algae; Algae, phytoplankton, algal mat;	EXPO GRO PHASE	24 H	PSE		<=1270	213095	89
	Algae: Algae, phytoplankton, algal mat;	PHYTOPLANKTON	124 H	PGR		10 to 400	311876	83
	Algae; Algae, phytoplankton, algal mat;	PHYTOPLANKTON	14 D	BMS *		100	313109	88
	Aquatic community: Aquatic community;	OLIGOTROPHIC STREAM	NR	POP •		2.5 to 15	218766	88
	Brachionus calyciflorus; Rotifer,	NEONATE	24 H	LC ₅₀	56		219385	91
	Brachionus calyciflorus; Rotifer,	NEONATE	24 H	LC50	31		219385	91
	Callitriche platycarpa; Macrophyte;	ZZ.	28 D	LT50 (Cab)	9,000		218344	78
•	Carassius auratus; Goldfish;	NK	to 4 WK	YHY	;	100 to 4000	213419	86
	Ceriodaphnia dubia; Water Ilea;	NEONAIE, <12 H, FIRST INSTAR	48 H	ည္သိုင္	26		213110	68 8
	Ceriodaphnia dubia: Water flea.	NEONATE <12 H FIRST INSTAR	48 H	ا ا	110		213110	ç ç
	Ceriodaphnia dubia; Water flea;	ADULT	# 8 4	§ 2	, 2		213110	89
				2.				;



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Table 0.1–9 AQUIRE Freshwater Toxicity Information ($\mu g/L$) AOC 57

Remedial Investigation Report Devens, Massachusetts

Copper (cont.)

Chemical Name Ceriodaphnia dubia; Water flear, Ceriodaphnia dubia	\$6	Age	Exposure	Effect	Effect Concentration Lethal Sublethal		AQUIRE Reference Number Pub 213110 213110	Year of Publication
Ceriodaphnia dubia; Water Ceriodaphnia dubia		NHONATE <12 H RIBST INSTAR			-			olication 80
		VHONATE <12 H PIRST INSTAR	-				13110 13110	80
		17071777 77777 77777	48 H	LÇ	78	7	13110	60
Ceriodaphnia dubia, Water Ceriodaphnia dubia		ADULT	48 H	LCS	71	2		89
Ceriodaphnia dubia, Water Ceriodaphnia dubia		NEONATE, <12 H, FIRST INSTAR	48 H	LC	30	2	213110	86
Ceriodaphnia dubia, Water Ceriodaphnia phinosus, Midg Chirconomus plumosus, Midg Chirconomus plumosus, Midg Chirconomus riparius, Midg Chirconomus riparius, Midg Chirconomus riparius, Midg Chirconomus riparius, Midg Chirconomus riparius, Midg		ADULT	48 H	Lou	79	2	213110	89
Ceriodaphnia dubia; Water Ceriodaphnia plumosus; Mide Chirconmus plumosus; Mide Chirconmus plumosus; Mide Chirconmus ripartis; Mide Chirconmus ripartis; Mide Chirconmus ripartis; Mide Chirconmus ripartis; Mide Chirconmus ripartis; Mide Chirconmus ripartis; Mide		NEONATE, <12 H, FIRST INSTAR	48 H	LC30	95	2	213110	89
Ceriodaphnia dubia; Water Ceriodaphnia dubia		<4H	48 H	LC	17	'n	311181	84
Ceriodaphnia dubia, Water Ceriodaphnia dubia, Capiconomus plumosus, Midge Chirconomus plumosus, Midge Chirconomus plumosus, Midge Chirconomus plumosus, Midge Chirconomus plumosus, Midge Chirconomus ripartias, Midge		NEONATE, <12 H, FIRST INSTAR	48 H	LC	31	2	213110	89
Ceriodaphnia dubia; Water Ceriodaphnia dubia		NEONATE, <12 H. FIRST INSTAR	48 H	LC.	17	7	213110	89
Ceriodaphnia dubia; Water Ceriodaphnia dubia		NEONATE, < 12 H. FIRST INSTAR	48 H	ro.	32	6	213110	89
Ceriodaphnia dubia, Water Ceriodaphnia plumosus, Mide Chirconomus plumosus, Mide Chirconomus plumosus, Mide Chirconomus ripartias, Mide Chirconomus ripa		NEONATE, <12 H, FIRST INSTAR	48 H	LC	20	2	213110	89
Ceriodaphnia dubia, Water Chirconomus plumosus, Mid Chirconomus plumosus, Mid Chirconomus plumosus, Mid Chirconomus plumosus, Mid Chirconomus riparius; Midg Chirconomus riparius; Midg Chirconomus riparius; Midg Chirconomus riparius; Midg Chirconomus riparius; Midg Chirconomus riparius; Midg Chirconomus riparius; Midg Chirconomus riparius; Midg Chirconomus riparius; Midg Chirconomus riparius; Midg Chirconomus riparius; Midg Chirconomus riparius; Midg Chirconomus riparius; Midg Chirconomus riparius; Midg Chirconomus riparius; Midg Chirconomus riparius; Midg Chirconomus riparius; Midg		NEONATE, <12 H. FIRST INSTAR	48 H	LCS	34	7	213110	89
Ceriodaphnia dubia, Water Ceriodaphnia dubia		NEONATE, <12 H. FIRST INSTAR	48 H		23	2	213110	89
Ceriodaphnia dubia, Water Ceriodaphnia bubia, Water Ceriodaphnia bubia		NEONATE < 12 H FIRST INSTAR	48 H		37	. 6.	213110	80
Ceriodaphiia dubia, Water Chirconoms plumosus, Mide Chirconoms plumosus, Mid Chirconoms plumosus, Mid Chirconoms plumosus, Mid Chirconoms plumosus, Mid Chirconoms plumosus, Mid Chirconoms riparius, Mida Chirconoms riparius, Mida Chirconoms riparius, Mida Chirconoms riparius, Mida Chirconoms riparius, Mida Chirconoms riparius, Mida Chirconoms riparius, Mida Chirconoms riparius, Mida Chirconoms riparius, Mida Chirconoms riparius, Mida Chirconoms riparius, Mida		NEONATE <12 H FIRST INSTAR	48 H	NC.	25	. 6	213110	80
Ceriodaphnia dubia, Water Chiconomus plumosus, Mide Chirconomus plumosus, Mid Chirconomus plumosus, Mid Chirconomus plumosus, Mid Chirconomus plumosus, Mid Chirconomus plumosus, Mid Chirconomus plumosus, Mid Chirconomus plumosus, Mid Chirconomus riparius, Mida Chirconomus riparius, Mida Chirconomus riparius, Mida Chirconomus riparius, Mida Chirconomus riparius, Mida Chirconomus riparius, Mida Chirconomus riparius, Mida Chirconomus riparius, Mida Chirconomus riparius, Mida		NEONATE <12 H FIRST INSTAR	48 H	06.7.1 1.0.1	38	, ,	213110	80
Ceriodaphnia dubia, water Ceriodaphnia dubia, water Ceriodaphnia dubia, Water Ceriodaphnia bubia, Water Ceriodaphnia bubia, Water Ceriodaphnia bubia, Water Ceriodaphnia bubia, Water Ceriodaphnia bubia, Water Ceriodaphnia bubia, Water Ceriodaphnia bubia, Water Ceriodaphnia bubia, Water Ceriodaphnia bubia, Water Ceriodaphnia bubosus, Mid Chirconmus plumosus, Mid Chirconmus plumosus, Mid Chirconmus riparius, Midg Chirconmus riparius, Midg Chirconmus riparius, Midg Chirconmus riparius, Midg Chirconmus riparius, Midg Chirconmus riparius, Midg		ADDITION SIGNATURES INSTRUCTIONS	H 64	08 01 1	2 4	1 c	213110	8
Certodaphnia dubia, water Ceriodaphnia dubia, Water Ceriodaphnia dubia, Water Ceriodaphnia dubia, Water Ceriodaphnia dubia, Water Ceriodaphnia dubia, Water Ceriodaphnia dubia, Water Ceriodaphnia dubia, Water Ceriodaphnia dubia, Water Ceriodaphnia dubia, Water Ceriodaphnia dubia, Water Ceriodaphnia dubia, Water Ceriodaphnia dubia, Water Ceriodaphnia dubia, Water Ceriodaphnia dubia, Water Ceriodaphnia dubia, Water Ceriodaphnia dubia, Water Ceriodaphnia dubia, Water Ceriodaphnia dubia, Water Ceriodaphnia plumosus, Mid Chirconums plumosus, Mid Chirconums plumosus, Mid Chirconums plumosus, Mid Chirconums plumosus, Mid Chirconums plumosus, Mid Chirconums plumosus, Mid Chirconums plumosus, Mid Chirconums plumosus, Mid Chirconums plumosus, Mid Chirconums riparius, Mida Chirconums riparius, Mida Chirconums riparius, Mida Chirconums riparius, Mida Chirconums riparius, Mida Chirconums riparius, Mida Chirconums riparius, Mida Chirconums riparius, Mida Chirconums riparius, Mida		ADOLI	4 4	1 1 2	00 5	v (213110	60 0
Certodaphnia dubia, Water Ceriodaphnia dubia, Water Ceriodaphnia dubia, Water Ceriodaphnia dubia, Water Ceriodaphnia dubia, Water Ceriodaphnia dubia, Water Ceriodaphnia dubia, Water Ceriodaphnia dubia, Water Ceriodaphnia dubia, Water Ceriodaphnia dubia, Water Ceriodaphnia dubia, Water Ceriodaphnia dubia, Water Ceriodaphnia dubia, Water Ceriodaphnia dubia, Water Ceriodaphnia dubia, Water Ceriodaphnia dubia, Water Ceriodaphnia dubia, Water Chironomus plumosus, Midge fami Chironomus plumosus, Mid Chironomus plumosus, Mid Chironomus plumosus, Mid Chironomus plumosus, Mid Chironomus plumosus, Mid Chironomus plumosus, Mid Chironomus plumosus, Mid Chironomus plumosus, Mid Chironomus plumosus, Mid Chironomus plumosus, Mid Chironomus plumosus, Mid Chironomus plumosus, Mid Chironomus riparius, Mida Chironomus riparius, Mida Chironomus riparius, Mida Chironomus riparius, Mida		TONIAME, < 12 H, FIRST INSTAR	4 5	, i	74 6	4 6	12110	60
Ceriodaphnia dubia, Water Chirconomus plumosus, Mid Chirconomus plumosus, Mid Chirconomus plumosus, Mid Chirconomus plumosus, Mid Chirconomus plumosus, Mid Chirconomus ripartus, Midg Chirconomus ripartus, Midg Chirconomus ripartus, Midg Chirconomus ripartus; Midg Chirconomus ripartus; Midg Chirconomus ripartus; Midg Chirconomus ripartus; Midg Chirconomus ripartus; Midg Chirconomus ripartus; Midg			48 H		104	7 (215110	60
Ceriodaphnia dubia, Water Ceriodaphnia dubia, Water Ceriodaphnia dubia, Water Ceriodaphnia dubia, Water Ceriodaphnia dubia, Water Ceriodaphnia dubia, Water Ceriodaphnia dubia, Water Ceriodaphnia dubia, Water Ceriodaphnia dubia, Water Ceriodaphnia dubia, Water Ceriodaphnia dubia, Water Ceriodaphnia dubia, Water Ceriodaphnia dubia, Water Ceriodaphnia dubia, Water Ceriodaphnia dubia, Water Ceriodaphnia dubia, Water Ceriodaphnia dubia, Water Chirconoms plumosus, Mid Chirconoms plumosus, Mid Chirconoms plumosus, Mid Chirconoms plumosus, Mid Chirconoms plumosus, Mid Chirconoms plumosus, Mid Chirconoms plumosus, Mid Chirconoms plumosus, Mid Chirconoms plumosus, Mid Chirconoms plumosus, Mid Chirconoms riparius, Midg Ch		NEONATE, <12 H, FIRST INSTAR	48 H	55.	449	7	213110	80 0
Ceriodaphnia dubia, Water Ceriodaphnia dubia, Water Ceriodaphnia dubia, Water Ceriodaphnia dubia, Water Ceriodaphnia dubia, Water Ceriodaphnia dubia, Water Ceriodaphnia dubia, Water Ceriodaphnia dubia, Water Ceriodaphnia dubia, Water Ceriodaphnia dubia, Water Ceriodaphnia dubia, Water Ceriodaphnia dubia, Water Ceriodaphnia dubia, Water Chirconoms plumosus, Mid Chirconoms plumosus, Mid Chirconoms plumosus, Mid Chirconoms plumosus, Mid Chirconoms plumosus, Mid Chirconoms plumosus, Mid Chirconoms plumosus, Mid Chirconoms plumosus, Mid Chirconoms plumosus, Mid Chirconoms plumosus, Mid Chirconoms plumosus, Mid Chirconoms plumosus, Mid Chirconoms plumosus, Mid Chirconoms plumosus, Mid Chirconoms riparius, Midg Chirconoms riparius, Midg Chirconoms riparius, Midg Chirconoms riparius, Midg		NEONATE, <12 H, FIRST INSTAR	48 H	05 T	21	7	213110	68
Ceriodaphnia dubia, Water Ceriodaphnia dubia, Water Ceriodaphnia dubia, Water Ceriodaphnia dubia, Water Ceriodaphnia dubia, Water Ceriodaphnia dubia, Water Ceriodaphnia dubia, Water Ceriodaphnia dubia, Water Ceriodaphnia dubia, Water Ceriodaphnia dubia, Water Ceriodaphnia dubia, Water Chirconomus plumosus, Mide Chirconomus plumosus, Mid Chirconomus plumosus, Mid Chirconomus plumosus, Mid Chirconomus plumosus, Mid Chirconomus plumosus, Mid Chirconomus plumosus, Mid Chirconomus plumosus, Mid Chirconomus plumosus, Mid Chirconomus plumosus, Mid Chirconomus plumosus, Mid Chirconomus plumosus, Mid Chirconomus plumosus, Mid Chirconomus plumosus, Mid Chirconomus plumosus, Mid Chirconomus plumosus, Mid Chirconomus riparius, Mida Chirconomus riparius, Mida Chirconomus riparius, Mida Chirconomus riparius, Mida		NEONATE, <12 H, FIRST INSTAR	48 H	ΓC_{50}	28	2	213110	86
Ceriodaphnia dubia; Water Ceriodaphnia dubia; Water Ceriodaphnia dubia; Water Ceriodaphnia dubia; Water Ceriodaphnia dubia; Water Ceriodaphnia dubia; Water Ceriodaphnia dubia; Water Ceriodaphnia dubia; Water Ceriodaphnia dubia; Water Ceriodaphnia dubia; Water Ceriodaphnia dubia; Water Ceriodaphnia dubia; Water Ceriodaphnia dubia; Water Ceriodaphnia dubia; Water Chirconoms plumosus; Mid Chirconoms plumosus; Mid Chirconoms plumosus; Mid Chirconoms plumosus; Mid Chirconoms plumosus; Mid Chirconoms plumosus; Mid Chirconoms plumosus; Mid Chirconoms plumosus; Mid Chirconoms plumosus; Mid Chirconoms riparius; Midg Chirconoms riparius; Midg Chirconoms riparius; Midg Chirconoms riparius; Midg Chirconoms riparius; Midg		ADULT	48 H	ΓC_{50}	127	2	213110	88
Ceriodaphnia dubia; Water Ceriodaphnia dubia; Water Ceriodaphnia dubia; Water Ceriodaphnia dubia; Water Ceriodaphnia dubia; Water Ceriodaphnia dubia; Water Ceriodaphnia dubia; Water Ceriodaphnia dubia; Water Ceriodaphnia dubia; Water Chirconoms plumosus; Mid Chirconoms plumosus; Mid Chirconoms plumosus; Mid Chirconoms plumosus; Mid Chirconoms plumosus; Mid Chirconoms plumosus; Mid Chirconoms plumosus; Mid Chirconoms plumosus; Mid Chirconoms plumosus; Mid Chirconoms plumosus; Mid Chirconoms plumosus; Mid Chirconoms plumosus; Mid Chirconoms plumosus; Mid Chirconoms riparius; Midg Chirconoms riparius; Midg Chirconoms riparius; Midg Chirconoms riparius; Midg		NEONATE, <12 H, FIRST INSTAR	48 H	ΓC_{50}	67	2	213110	88
Ceriodaphnia dubia; Water Ceriodaphnia dubia; Water Ceriodaphnia dubia; Water Ceriodaphnia dubia; Water Ceriodaphnia dubia; Water Ceriodaphnia dubia; Water Ceriodaphnia dubia; Water Chirconomus plumosus; Mide Chirconomus plumosus; Mid Chirconomus plumosus; Mid Chirconomus plumosus; Mid Chirconomus plumosus; Mid Chirconomus plumosus; Mid Chirconomus plumosus; Mid Chirconomus plumosus; Mid Chirconomus plumosus; Mid Chirconomus plumosus; Mid Chirconomus plumosus; Mid Chirconomus plumosus; Mid Chirconomus plumosus; Mid Chirconomus plumosus; Mid Chirconomus riparius; Midg Chirconomus riparius; Midg Chirconomus riparius; Midg Chirconomus riparius; Midg Chirconomus riparius; Midg		NEONATE, <12 H, FIRST INSTAR	48 H	$^{ m LC}_{50}$	19	62	213110	80
Ceriodaphnia dubia, Water Ceriodaphnia dubia, Water Ceriodaphnia dubia, Water Ceriodaphnia dubia, Water Ceriodaphnia dubia, Water Chirconoma plumosus, Mid Chirconoma plumosus, Mid Chirconomas plumosus, Mid Chirconomas plumosus, Mid Chirconomas plumosus, Mid Chirconomas plumosus, Mid Chirconomas plumosus, Mid Chirconomas plumosus, Mid Chirconomas plumosus, Mid Chirconomas plumosus, Mid Chirconomas plumosus, Mid Chirconomas plumosus, Mid Chirconomas plumosus, Mid Chirconomas plumosus, Mid Chirconomas plumosus, Mid Chirconomas plumosus, Mid Chirconomas riparius, Midg Chirconomas riparius, Midg Chirconomas riparius, Midg Chirconomas riparius, Midg Chirconomas riparius, Midg		NEONATE, <12 H, FIRST INSTAR	48 H	LC ₅₀	81	63	213110	83
Ceriodaphnia dubia, Water Ceriodaphnia dubia, Water Ceriodaphnia dubia, Water Ceriodaphnia dubia, Water Chirconmus plumosus, Mic Chirconmus plumosus, Mic Chirconmus plumosus, Mic Chirconmus plumosus, Mic Chirconmus plumosus, Mic Chirconmus plumosus, Mic Chirconmus plumosus, Mic Chirconmus plumosus, Mic Chirconmus plumosus, Mic Chirconmus plumosus, Mic Chirconmus plumosus, Mic Chirconmus plumosus, Mic Chirconmus plumosus, Mic Chirconmus plumosus, Mic Chirconmus plumosus, Mic Chirconmus plumosus, Mic Chirconmus plumosus, Mic Chirconmus plumosus, Mic Chirconmus riparius, Midg Chirconmus riparius, Midg Chirconmus riparius, Midg Chirconmus riparius, Midg		NEONATE, <12 H, FIRST INSTAR	48 H	Γ_{S0}^{-1}	24		213110	86
Ceriodaphnia dubia; Water Ceriodaphnia dubia; Water Ceriodaphnia dubia; Water Ceriodaphnia dubia; Water Chirconomus plumosus; Mid Chirconomus plumosus; Mid Chirconomus plumosus; Mid Chirconomus plumosus; Mid Chirconomus plumosus; Mid Chirconomus plumosus; Mid Chirconomus plumosus; Mid Chirconomus plumosus; Mid Chirconomus plumosus; Mid Chirconomus plumosus; Mid Chirconomus plumosus; Mid Chirconomus plumosus; Mid Chirconomus plumosus; Mid Chirconomus riparius; Midg Chirconomus riparius; Midg Chirconomus riparius; Midg Chirconomus riparius; Midg		NEONATE, <12 H, FIRST INSTAR	48 H	ΓC_{50}	78	63	213110	86
Ceriodaphnia dubia; Water Ceriodaphnia dubia; Water Chiroromidae; Midge fami Chiroromus plumosus; Mid Chiroromus plumosus; Mid Chiroromus plumosus; Mid Chiroromus plumosus; Mid Chiroromus plumosus; Mid Chiroromus plumosus; Mid Chiroromus plumosus; Mid Chiroromus plumosus; Mid Chiroromus plumosus; Mid Chiroromus plumosus; Mid Chiroromus plumosus; Mid Chiroromus plumosus; Mid Chiroromus plumosus; Mid Chiroromus plumosus; Mid Chiroromus riparius; Midg Chiroromus riparius; Midg Chiroromus riparius; Midg Chiroromus riparius; Midg		FIRST INSTAR NEONATES, 2–8 H	7D	MOR	1.5 to 122.5	-	213110	89
Ceriodaphnia dubia, Water Chirconomia plumosus, Midge fami Chirconomis plumosus, Mid Chirconomis plumosus, Mid Chirconomis plumosus, Mid Chirconomis plumosus, Mid Chirconomis plumosus, Mid Chirconomis plumosus, Mid Chirconomis plumosus, Mid Chirconomis plumosus, Mid Chirconomis plumosus, Mid Chirconomis plumosus, Mid Chirconomis plumosus, Mid Chirconomis plumosus, Mid Chirconomis plumosus, Mid Chirconomis plumosus, Mid Chirconomis plumosus, Mid Chirconomis riparius, Mid Chirconomis		FIRST INSTAR NEONATES, 2–8 H	J.D	REP *			213110	88
Chironomidae; Midge fami Chironomus plumosus, Midge Chironomus plumosus, Mid Chironomus plumosus, Mid Chironomus plumosus, Mid Chironomus plumosus, Mid Chironomus plumosus, Mid Chironomus plumosus, Mid Chironomus plumosus, Mid Chironomus plumosus, Mid Chironomus plumosus, Mid Chironomus plumosus, Mid Chironomus plumosus, Mid Chironomus plumosus, Mid Chironomus plumosus, Mid Chironomus plumosus, Mid Chironomus riparius, Midg Chironomus riparius, Midg Chironomus riparius, Midg		FIRST INSTAR NEONATES, 2–8 H	7D	REP *			213110	88
Chirconomus plumosus, Mic Chirconomus plumosus, Mic Chirconomus plumosus, Mic Chirconomus plumosus, Mic Chirconomus plumosus, Mic Chirconomus plumosus, Mic Chirconomus plumosus, Mic Chirconomus plumosus, Mic Chirconomus plumosus, Mic Chirconomus plumosus, Mic Chirconomus plumosus, Mic Chirconomus plumosus, Mic Chirconomus riparius, Mic Chirconomus riparius, Mic Chirconomus riparius, Mic Chirconomus riparius, Mic Chirconomus riparius, Mic Chirconomus riparius, Mic Chirconomus riparius, Mic Chirconomus riparius, Mic Chirconomus riparius, Mic Chirconomus riparius, Mic Chirconomus riparius, Mic Chirconomus riparius, Mici		LARVAE	12 MO	POP		67 2	213176	88
Chirconnus plumosus; Mid Chirconnus plumosus; Mid Chirconnus plumosus; Mid Chirconnus plumosus; Mid Chirconnus plumosus; Mid Chirconnus plumosus; Mid Chirconnus plumosus; Mid Chirconnus plumosus; Mid Chirconnus plumosus; Mid Chirconnus plumosus; Mid Chirconnus plumosus; Mid Chirconnus riparius; Midg Chirconnus riparius; Midg Chirconnus riparius; Midg Chirconnus riparius; Midg Chirconnus riparius; Midg Chirconnus riparius; Midg Chirconnus riparius; Midg Chirconnus riparius; Midg Chirconnus riparius; Midg Chirconnus riparius; Midg Chirconnus riparius; Midg		LARVA-STATE L1	24 H	LC_{50}	3,160	2	215356	89
Chircnomus plumosus; Mid Chircnomus plumosus; Mid Chircnomus plumosus; Mid Chircnomus plumosus; Mid Chircnomus plumosus; Mid Chircnomus plumosus; Mid Chircnomus plumosus; Mid Chircnomus plumosus; Mid Chircnomus plumosus; Mid Chircnomus plumosus; Mid Chircnomus plumosus; Mid Chircnomus riparius; Midg Chircnomus riparius; Midg Chircnomus riparius; Midg Chircnomus riparius; Midg Chircnomus riparius; Midg Chircnomus riparius; Midg Chircnomus riparius; Midg Chircnomus riparius; Midg Chircnomus riparius; Midg Chircnomus riparius; Midg Chircnomus riparius; Midg		LARVA-STATE L2	24 H	$^{ m LC}_{50}$	8,590	2	215356	89
Chirconoms plumosus, Mic Chirconoms plumosus, Mic Chirconoms plumosus, Mic Chirconoms plumosus, Mic Chirconoms plumosus, Mic Chirconoms plumosus, Mic Chirconoms plumosus, Mic Chirconoms plumosus, Mic Chirconoms plumosus, Mic Chirconoms plumosus, Mic Chirconoms riparius, Midg Chirconoms riparius, Midg Chirconoms riparius, Midg Chirconoms riparius, Midg Chirconoms riparius, Midg Chirconoms riparius, Midg		LARVA-STATE L2	48 H	LC_{50}	3.760	63	215356	83
Chironomus plumosus; Mic Chironomus plumosus; Mid Chironomus plumosus; Mid Chironomus plumosus; Mid Chironomus plumosus; Mid Chironomus plumosus; Mid Chironomus plumosus; Mid Chironomus plumosus; Mid Chironomus riparius; Midg Chironomus riparius; Midg Chironomus riparius; Midg Chironomus riparius; Midg Chironomus riparius; Midg Chironomus riparius; Midg Chironomus riparius; Midg		LARVA-STATE L2	72 H	${ m LC}_{50}$	1,990	6	215356	86
Chircnomus plumosus; Mic Chircnomus plumosus; Mic Chircnomus plumosus; Mic Chircnomus plumosus; Mic Chircnomus plumosus; Mic Chircnomus plumosus; Mic Chircnomus riparius; Mic Chircnomus riparius; Mic Chircnomus riparius; Mick Chircnomus riparius; Mick Chircnomus riparius; Mick Chircnomus riparius; Mick Chircnomus riparius; Mick Chircnomus riparius; Mick		LARVA-STATE L2	H 96	ΓC_{50}	1,580	2	215356	88
Chircnomus plumosus, Mid Chircnomus plumosus, Mid Chircnomus plumosus, Mid Chircnomus plumosus, Mid Chircnomus plumosus, Mid Chircnomus plumosus, Mid Chircnomus ripartus, Midg Chircnomus ripartus, Midg Chircnomus ripartus, Midg Chircnomus ripartus; Midg Chircnomus ripartus; Midg Chircnomus ripartus; Midg Chircnomus ripartus; Midg Chircnomus ripartus; Midg		LARVA-STATE L3	24 H	ΓC_{50}	>10000	2	215356	80
Chircnomus plumosus; Mid Chircnomus plumosus; Mid Chircnomus plumosus; Mid Chircnomus plumosus; Mid Chircnomus plumosus; Mid Chircnomus riparius; Midg Chircnomus riparius; Midg Chircnomus riparius; Midg Chircnomus riparius; Midg Chircnomus riparius; Midg Chircnomus riparius; Midg Chircnomus riparius; Midg		LARVA-STATE L3	48 H	$^{ m LC}_{50}$	2,050	63	215356	86
Chircoromus plumosus; Mido Chircoromus plumosus; Mido Chircoromus plumosus; Mido Chircoromus plumosus; Mido Chircoromus ripartus;		LARVA-STATE L3	72 H	ΓC_{50}	086	2	215356	86
Chironomus plumosus; Mid Chironomus plumosus; Mid Chironomus plumosus; Mid Chironomus riparlus; Midg Chironomus riparlus; Midg Chironomus riparlus; Midg Chironomus riparlus; Midg		LARVA-STATE L3	H 96	ΓC_{50}	530	2	215356	89
Chironomus plumosus, Mid Chironomus plumosus, Mid Chironomus plumosus, Mid Chironomus riparlus, Midg Chironomus riparlus, Midg Chironomus riparlus, Midg Chironomus riparlus, Midg		LARVA-STATE L4	24 H	LC_{50}	23,600	2	215356	89
Chironomus plumosus; Mid Chironomus plumosus; Mid Chironomus ripartus; Midg Chironomus ripartus; Midg Chironomus ripartus; Midg		LARVA-STATE L4	48 H	ΓC_{50}	12,510	7	215356	89
Chirconomus plumosus; Mid Chirconomus riparius; Midg Chirconomus riparius; Midg Chirconomus riparius; Midg Chirconomus riparius; Midg		LARVA-STATE L4	72 H	ΓC_{50}	6.260	63	215356	88
Chircnomus riparlus; Midg Chircnomus riparlus; Midg Chircnomus riparlus; Midg Chircnomus riparlus; Midg		LARVA-STATE L4	H 96	$^{ m LC}_{50}$	2,200	2	215356	89
Chironomus ripartus, Midg Chironomus ripartus, Midg Chironomus ripartus, Midg		2ND INSTAR LARVAE	240 H	ΓC_{50}	200	2	215023	91
Chironomus riparius; Midgi Chironomus riparius; Midgi		2ND INSTAR LARVAE	48 H	Γ_{50}	1,200	2	215023	91
Chironomus riparius; Midgi		2ND INSTAR LARVAE	H 96	ΓC_{50}	700	2	215023	91
	,	LARVA-STATE L1	24 H	LC_{50}	3,400	8	215356	88
Chironomus riparius; Midge;		LARVA-SIATE L2	24 H	LC ₅₀	9,070	2	215356	68
Chironomus riparius; Midge;		LARVA-STATE L2	48 H	Γ_{S_0}	3,910	7	215356	68
Chironomus riparius; Midge		LARVA-SFATE L2	72 H	$\Gamma_{50}^{c_{50}}$	1,860	2	215356	86

Table O.1–9 AQUIRE Freshwater Toxicity Information (μ g/L) AOC 57

Remedial Investigation Report Devens, Massachusetts

Copper (cont.)

		DOVELIS, INTRODUCING	tra l				L
Chemical Name	Species	Age	Exposure	Effect	Effect Concentration	AQUIRE	Year
	4	-	•		Lethal Subletha	L	Pub
er (cont.)	Chircnomus riparius; Midge;	LARVA-STATE L2	H 96	LCsn	1,270	215356	89
,	Chironomus riparius; Midge;	LARVA-STATE L3	24 H	LÇ	13,430	215356	89
	Chironomus riparius; Midge;	LARVA-STATE L3	48 H	LC50	4,220	215356	
	Chironomus riparius; Midge;	LARVA-STATE L3	72 H	LC30	1,630	215356	
	Chironomus riparius; Midge;	LARVA-STATE L3	H 96	ΓC_{50}	1,260	215356	
	Chironomus riparius; Midge;	LARVA-STATE L4	24 H	LCS	8,990	215356	
	Chircnomus riparius; Midge;	LARVA-STATE L4	48 H	Γ_{S_0}	2,940	215356	
	Chircnomus riparius; Midge;	LARVA-STATE L4	72 H	LC ₅₀	1,120	215356	
	Chironomus riparius; Midge;	LARVA-STATE L4	H 96	LC3	640	215356	89
	Chironomus tentans; Midge;	LARVA-STATE L1	24 H	ΓC_{50}	2,700	215356	
	Chironomus tentans; Midge;	LARVA-STATE L2	24 H	ΓC_{50}	7,100	215356	
	Chircnomus tentans; Midge;	LARVA-STATE L2	48 H	ΓC_{50}	2,400	215356	
	Chircnomus tentans; Midge;	LARVA-STATE L2	72 H	ΓC_{50}	1,350	215356	
	Chironomus tentans; Midge;	LARVA-STATE L2	H 96	ΓC_{50}	540	215356	
	Chircnomus tentans; Midge;	LARVA-STATE L3	24 H	LC ₅₀	10,100	215356	
	Chironomus tentans; Midge;	LARVA-STATE L3	48 H	LC ₅₀	3,100	215356	
	Chironomus tentans; Midge;	LARVA-STATE L3	72 H	ΓC_{50}	850	215356	
	Chironomus tentans; Midge;	LARVA-STATE L3	H 96	ΓC_{50}	550	215356	
	Chironomus tentans; Midge;	LARVA-STATE L4	24 H	LC30	>10000	215356	
	Chironomus tentans; Midge;	LARVA-STATE L4	48 H	ΓC_{50}	2,200	215356	
	Chironomus tentans; Midge;	LARVA-STATE L4	72 H	ΓC_{50}	870	215356	
	Chironomus tentans; Midge;	LARVA-STATE L4	H 96	ΓC_{50}	310		
	Chlorella vulgaris; Green algae;	NR	8D	FGR	10 to 400		
	Cypris subglobosa; Ostracod;	NR	12 H	ΓC_{50}	13,581	312365	
	Cypris subglobosa; Ostracod;	NR	24 H	LC_{50}	12,200	312365	
	Cypris subglobosa; Ostracod;	NR	48 H	ΓC_{50}	5,363	312365	
	Cypris subglobosa; Ostracod;	NR	H 96	ΓC_{50}	277.3	312365	
	Daphnia lumholzi; Water slea;	NR	12 H	LC ₅₀	83	312365	
	Daphnia lumholzi; Water slea;	NR.	24 H	LCso	67.2	312365	
	Daphnia lumholzi; Water slea;	N. S. S. S. S. S. S. S. S. S. S. S. S. S.	48 H	, C.	54.6	312365	
	Daphnia lumholzi; Water slea;	ZX	H 96	ΓC_{50}	9.4		
	Daphnia magna; Water flea;	> 24 H	48 H	$EC_{50}IM$ (Calc)			
	Daphnia magna; Water slea;	> 24 H	48 H	EC ₅₀ IM (Calc)			
	Daphnia magna; Water ilea;	H \$7 == >	48 H	ECsolM (Calc)			
	Daphnia magna; Water Ilea;	H +7 <	H 69	ECSOIM (Calc)			
	Daphnia magna; Water Ilea;	> 24 H	48 H	ECSOIM (Calc)		140 310033	
	Darbais magna; Water nea;	7.7. T	11 04	ECSOIM (Cale)			2 04
	Daphnia magna: Water flea:	× 24 H	48 H	ECSOTA (Calc)			
	Danhnia magna: Water flea:	> 24 H	48 H	EC. IM (Calc)			
	Daphnia magna: Water flea:	> 24 H	48 H	EC. IM (Cab)			
	Daphnia magna; Water flea;	> 24 H	48 H	EC _{fo} IM (Calc)			
	Daphnia magna; Water slea;	< 24 H	48 H	LC	54	311181	
	Daphnia magna; Water flea;	NR	24 H	MOR	172	312372	
	Daphnia pulex; Water flea;	< 24 H	36 D	LET	10.1	310453	3 84
	Daphnia pulex; Water flea;	< 24 H	42 D	REP *		10.1 310453	
	Daphnia pulex; Water flea;	< 24 H	48 H	ΓC_{50}	53	311181	
	Daphnia pulicaria; Water slea:	NR	48 H	ΓC_{50}	10.8	215081	
	Daphnia pulicaria; Water flea;	NR	48 H	ΓC_{50}	11.4	215081	
	Daphnia pulicaria; Water slea;	NR	48 H	LC ₅₀	113	215081	1 78
	Daphnia pulicaria; Water flea;	NR.	48 H	ΓC_{50}	16.5	21508	•



Table 0.1–9 AQUIRE Freshwater Toxicity Information ($\mu g/L$) AOC 57

Remedial Investigation Report Devens, Massachusetts

ſ			_	28	82	78	82	8/
	Year		Publication	, •	, •	,,	••	• •
	AQUIRE	Reference	Number	215081	215081	215081	215081	215081
	,.	ıtion	Sublethal					
	Effect	Concentration	Lethal	184	199	213	240	35.5
				LÇ	ĽČ	Ţ	ĽČ	rc ₅₀
		Effect						
		Exposure	•	48 H	48 H	48 H	48 H	48 H
Devells, Iviassaciiusetts		Age	b					
	-			NB	a z	N N	a N	A.
		Species	samaio	Dart is milionic Woter flor.	Dapining puncation, water itea,	Dapinia puncatia, water itea,	Dataile puncate, Water flee,	Dapinia puicatia, watei nea, Daphnia pulicaria; Water flea;
		N. T. T. T.	Chemical Name		Copper (cont.)			

Table O.1-9 AQUIRE Freshwater Toxicity Information (μg/L) AOC 57

Remedial Investigation Report Devens, Massachusetts

Chemical Name

Copper (cont.)

	Devens, Massachusetts	SI					
				Effect		AQUIRE	Year
sarado	Age	EAposuic	- Ingred	Lethal	Sublethal	Number	Publication
Daphnia pulicaria; Water flea;	NR	48 H	LCs	53.3		215081	78
Daphnia pulicaria; Water flea;	NR	48 H	ΓC_{50}	55.3		215081	78
Daphnia pulicaria; Water flea;	NR	48 H	LC ₅₀	55.4		215081	78
Daphnia pulicaria; Water flea;	NR	48 H	ΓC_{50}	627		215081	78
Daphnia pulicaria; Water flea;	NR	48 H	rc ₅₀	7.24		215081	78
Daphnia pulicaria; Water flea;	XX.	48 H	os Ci	76.4		215081	78
Daphnia pulicaria; Water slea;	ZZ :	48 H	. LC30	78.8		215081	78
Daphnia pulicaria; Water flea;	N. N. N. N. N. N. N. N. N. N. N. N. N. N	48 H	$\Gamma_{S0}^{C_{S0}}$	84.7		215081	78
Daphnia pulicaria; Water flea;	XX.	48 H	rCso	9.06		215081	78
Daphnia pulicaria; Water flea;	NR	48 H	LC30	9.3		215081	78
Daphnia pulicaria; Water slea;	NR	48 H	LCso	97.2	;	215081	78
Dugesia dorotcephala; Turbellarian, slatworm;	18-20 MM	11	BEH *	•	20 to 200	310581	91
Dugesia tigrina; Turbellarian, flatworm;	NR	H 96	LCso	2,450		218709	74
Elodea nuttallii; Waterweed, ditchmoss;	NR	14D	LT50 (Cab)	9,000		218344	78
Gambusia astīnis; Mosquitosīsh;	NR	12 H	${ m LC}_{50}$?	49		315578	78
Gambusia affinis; Mosquitofish;	NR	133 D	MOR *	3.2		315578	78
Gambusia assinis; Mosquitosish;	NR	48 H	MOR *	160		313098	88
Gambusia affinis; Mosquitofish;	NR	H 96	LC40,	56		315578	78
Gammarus lacustris; Scud;	ADULT	0.12 H	BEH		0.05 to 5000	311804	83
Gammarus lacustris; Scud;	NR	H 96	LÇ	212		313058	88
Gammarus pulex; Scud;	JUVENILE, 2-3 MOLT, 3-5 MM	240 H	LC	33		215023	91
Gammarus pulex; Scud;	JUVENILE, 2-3 MOLT, 3-5 MM	48 H	LC	47		215023	91
Gammarus pulex: Scud:	JUVENILE, 2-3 MOLT, 3-5 MM	H 96	rc.	37		215023	91
Gnathonemus petersii: Electric fish:	JUVENILE, 5-20G	4 H	* PHY		200	310685	84
Invertebrates, Invertebrates;	MACRO-INVERTEBRATES	14D	BEH *		5.5	213398	89
Invertebrates; Invertebrates;	MACROINVERTEBRATES	10 D	LC	15		210388	89
Invertebrates; Invertebrates;	MACROINVERTEBRATES	10 D	LC	9		210388	89
Invertebrates; Invertebrates;	MACROINVERTEBRATES	4D	LC	14		210388	68
Invertebrates; Invertebrates;	MACROINVERTEBRATES	4D	LC30	26		210388	89
Lamellidens marginalis; Mussel;	5.0-6.0 CM	1 to 30 D	GRÖ		250 to 1000	213776	91
Lamellidens marginalis; Mussel;	5.0-6.0 CM	1 to 30 D	00		250 to 1000	213776	91
Lamellidens marginalis; Mussel;	5.0-6.0 CM	H 96	LC30	2,000		213776	91
Lamellidens marginalis; Mussel;	1 CM	to 9.75 H	PHY *		250 to 1000	213311	89
Lamellidens marginalis; Mussel;	NR	H 96	LC_{50}	2,000		213311	86
Lamellidens marginalis; Mussel;	NR	H 96	LC_{50}	2,000		213875	91
Lenna minor; Duckweed;	20 COLONIES OR 40 FRONDS	4D	$EC_{50}GR$		1,100	311789	98
Lenna minor; Duckweed;	NR	21 D	LT50 (Cab)	6,000		218344	78
Lepomis macrochirus; Bluegill;	5.3-7.2 CM, 3.5-3.9 G	H 96	LC50	1,250		212406	89
Lepomis macrochirus; Bluegill;	N.K	4 t	BEH		36 to 130	212858	68
Lepomis macrochirus; Bluegill;	NR	X X	BEH 		25 to 1800	212858	68
Lophopodella carteri; Biyozoa;	ANCENSIKULAB, 2-3 DATS	H 06	9.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00	ore	1 750	210/03	2 3
Macrobrachium hendersodayanus; Frawn;	Z.	H 0.			1,730	CECTIC	40
Myriophyllum spicatum; Water-milfoil;		32D	EC ₂ oBM *		250	212262	4 5
Myriophyllum spicatum; Water – milloil;		32.0	ECSOBM .		380	212262	74
Myriophyllum spicatum; Water—miltoil;	4 CM APEX	32D	ECSOGK :		1,500	212262	47.
Myllofalyllulli spicaturi, water – inition,	+ CM ALEA	776	10000000000000000000000000000000000000	46.4.40	3	212202	t :
Oncorhynchus kisutch; Coho salmon, silver salmon;	JUVENILE 6G	H 95	5.7.1 1.5.0	164;17		310341	83
Oncorhynchus mykiss; Kambow trout, donaldson trout;	11 CM, 13 G	H 96	LC50 ?	250		212122	7.7
Oncornynchus mykiss; Kambow trout, donaldson trout;	32 MM, 0.30 G	. H CI	MOK :	200		218499	4/
Oncornynchus mykiss; Rambow trout, donaidson trout;	32 MM, U.36 G	10.01 H *	MOR.	200		218499	4 5
Oncornynchus myklss; Kambow (fout, uonaldson (fout;		U +7	LC50	130		71040	ŧ



Table 0.1–9 AQUIRE Freshwater Toxicity Information (μg/L) AOC 57

Remedial Investigation Report

Copper (cont.)

		Devens, Massachusetts						
N		<	Carro	Different	Effect		AQUIRE	Year
Chemical Name	sarpade	Age —	Exposure	nang	Lethal	Sublethal	Number	Ot Publication
ter (cont.)	Oncorhynchus mykiss: Rainhow trout donaldson trout:	32 MM 036G	24 H	10.5	140	Sastana	218499	74
ei (coin.)	Oncorhynchus mykiss: Rainhow trout, donaldson trout;	32 MM, 0.36 G	4.33 H *	MOR *	2.000		218499	74
	Oncorhynchus mykiss: Rainbow trout, donaldson trout:	32 MM. 0.36 G	5.5 H*	MOR *	2,000		218499	74
	Oncorhynchus mykiss: Rainbow trout, donaldson trout;	55.50	40D	GRO *		225	218386	76
	Oncorhynchus mykiss; Rainbow trout, donaldson trout;	6-8G	48 H	HEM *		30	219917	80
	Oncorhynchus mykiss; Rainbow trout, donaldson trout;	75-100 G	48 H	MOR *	85		315401	82
	Oncorhynchus mykiss; Rainbow trout, donaldson trout;	75-100 G	H 8	* YH4		170	315401	82
	Oncorhynchus mykiss; Rainbow trout, donaldson trout;	FINGERLING, 0.2G	1 WK	MOR *	4.0		315625	79
	Oncorhynchus mykiss; Rainbow trout, donaldson trout;	FINGERLING, 0.2G	1 WK	MOR *	5.8		315625	79
	Oncorhynchus mykiss; Rambow trout, donaldson trout;	FINGERLING, 0.2G	1 WK	MOR *	9.6		315625	79
	Oncorhynchus mykiss; Rainbow trout, donaldson trout;	FINGERLING, 0.2G	7D	* YH4		4.0	315625	79
	Oncorhynchus mykiss; Rainbow trout, donaldson trout;	FINGERLING, 0.25 G	1 WK	MOR *	5.1		315625	79
	Oncorhynchus mykiss; Rainbow trout, donaldson trout;	FINGERLING, 0.25 G	1 WK	MOR *	9.5		315625	79
	Oncorhynchus mykiss; Rainbow trout, donaldson trout;	FINGERLING, 0.25G	7.D	* YHY		2.1	315625	79
	Oncorhynchus mykiss; Rainbow trout, donaldson trout;	FINGERLING, 0.25G	7D	* PHY		3.9	315625	67
	Oncorhynchus mykiss; Rainbow trout, donaldson trout;	FINGERLING, 0.6 G	7D	PHY *		9	315625	79
	Oncorhynchus mykiss; Rainbow trout, donaldson trout;	NR	13 MO	MOR *	10		212122	72
	Oncorhynchus mykiss; Rainbow trout, donaldson trout;	NR	13 MO	MOR *	19		212122	72
	Oncorhynchus mykiss; Rainbow trout, donaldson trout;	NR	48 H	ΓC_{50}	400		218317	89
	Oncorhynchus mykiss; Rainbow trout, donaldson trout;	NR	48 H	ΓC_{50}	200		218317	89
	Oncorhynchus mykiss; Rambow trout, donaldson trout;	SAC-FRY	42 D	GRO * (Cab)		8	310527	83
	Oncorhynchus mykiss; Rainbow trout, donaldson trout;	SAC-FRY	42 D	MOR *	17		310527	83
	Oncorhynchus mykiss; Rainhow trout, donaldson trout;	SAC-FRY	42 D	MOR *	31		310527	83
	Oncorhynchus mykiss; Rainbow trout, donaldson trout;	SAC-FRY	42 D	MOR * (Calc)	10		310527	83
	Osteichthyes; Bony fish class;	ADULT GUPPY, 20-30 MM	48 H	LC,	21		212882	88
	Osteichthyes; Bony fish class;	ADULT GUPPY, 20-30 MM	H 96	LC50	16		212882	88
	Osteichthyes; Bony fish class;	JUVENILE GUPPY, 8-15 MM	48 H	LC50	14		212882	88
	Osteichthyes; Bony fish class;	JUVENILE GUPPY, 8-15 MM	H 96	ΓC_{50}	8.7		212882	88
	Pectinatella magnifica; Bryozoa;	ANCENSTRULAE, 2-3 DAYS	H 96	ΓC_{50}	140		216703	80
	Pimephales promelas; Fathead minnow;	EMBRYO, 1 D	30 D	GRO*		221.8	215081	78
	Pimephales promelas; Fathead minnow;	NEWLY HAT, < 24 H	7.D	GRO *		68.6	311182	85
	Pimephales promelas; Fathead minnow;	WLY HAT,	7.D	GRO *		25.8	311182	85
	Pimephales promelas; Fathead minnow;	NEWLY HAT, < 24 H	7D	ΓC_{50}	70		311182	85
	Pimephales promelas; Fathead minnow;	NR	H 96	ΓC_{50}	1,129		215081	78
	Pimephales promelas; Fathead minnow;	NR	H 96	LC50	114		215081	78
	Pimephales promelas; Fathead minnow;	NK The	H 96	5,7,1 5,50 1,50 1,50 1,50 1,50 1,50 1,50 1,	2,336		215081	78
	Finephales prometas, Fameau minnow,	NB NB	11 70	1 1 2	1001		215061	9 9
	Finephates prometas; Faureau minnow, Dimenhales prometas; Rathead minnour	NR NR	H 96	1 1 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	1,001		215081	8/ 8/
	Fillippirates prometas, rancau minnow,	ND	H 96	200	050 6		215081	2 87
	Finephates prometas, Fauteau minnow, Pimenhales prometas: Bathead minnow:	AN N	H 96	1,50	436		215081	2,82
	Pimenhales promelas: Fathead minnow:	NR	H 96	rT.	516		215081	78
	Pimenhales promelas: Fathead minnow:	NR	H 96	S T	88.5		215081	78
	Pimephales promelas; Fathead minnow;	NR	H 96	, C.	1,586		215081	78
	Pimephales promelas; Fathead minnow;	20-69 MM	H 96	LC ₅₀ ?	2,600		218320	76
	Pimephales promelas; Fathead minnow;	20-69 MM	H 96	LC_{50}° ?	20,000		218320	76
	Pimephales promelas; Fathead minnow;	20-69 MM	H 96	LC_{50} ?	21,000		218320	76
	Pimephales promelas; Fathead minnow;	2069 MM	H 96	LC_{50} ?	21,000		218320	76
	Pimephales promelas; Fathead minnow;	20-69 MM	H 96	$^{LC_{50}}$	> 16,000		218320	9/2
	Pimephales promelas, Fathead minnow;	20-69 MM	H 96	LC ₅₀ ?	20,000		218320	92
	Fimephates prometas; ramead minnow;	MIM 60-07	70 H	المحالة	21,000		218320	0/

Table O.1-9 AQUIRE Freshwater Toxicity Information (μg/L) AOC 57

Remedial Investigation Report Devens. Massachusetts

		Devens, Massachusetts					
Chemical Name	Species	Age	Effect		Effect Concentration	AQUIRE	Year
	J	ō ·			Lethal Sublethal	Number	Publication
Copper (cont.)	Pimephales promelas; Fathead minnow;	EMBRYO, 1 D	30 D	MOR *	221.8	215081	78
,	Plumatella emarginata; Bryozoan;	ANCENSTRULAE, 2-3 DAYS	H 96	LC ₃₀	140	216703	80
	Poecilia reticulata; Guppy;	JUVENILE	H 96	LC	112	212010	76
	Poecilia reticulata; Guppy;	JUVENILE	H 96		138	212010	76
	Procambarus clarkii; Red swamp crayfish;	ADULT, 24.8G, 9.3 CM	1045 H	LC ₅ 0	890	311758	83
	Procambarus clarkii; Red swamp crayfish;	ADULT, 24.8G, 9.3 CM	1227 H	LC50	776	311758	83
	Procambarus clarkii; Red swamp crayfish;	ADULT, 24.8G, 9.3 CM	1358 H	LC30	657	311758	83
	Procambarus clarkii; Red swamp crayfish;	ADULT, 24.8G, 9.3 CM	146 H	LC50	3,024	311758	83
	Procambarus clarkii; Red swamp crayfish;	ADULT, 24.8G, 9.3 CM	246 H	LC30	2,330	311758	83
	Procambarus clarkii; Red swamp crayfish;	ADULT, 24.8G, 9.3 CM	342 H	LC.30	1,780	311758	83
	Procambarus clarkii; Red swamp crayfish;	ADULT, 24.8G, 9.3 CM	453 H	LC ₅₀	1,520	311758	83
	Procambarus clarkii; Red swamp crayfish;	ADULT, 24.8G, 9.3 CM	49 H	ΓC_{50}	11,000	311758	83
	Procambarus clarkii; Red swamp crayfish;	ADULT, 24.8G, 9.3 CM	549 H	Γ_{50}^{C}	1,380	311758	83
	Procambarus clarkii; Red swamp crayfish;	ADULT, 24.8G, 9.3 CM	622 H	LC50	1,190	311758	83
	Procambarus clarkii; Red swamp crayfish;	ADULT, 24.8G, 9.3 CM	72 H	ΓC_{50}	8,100	311758	83
	Procambarus clarkii; Red swamp crayfish;	ADULT, 24.8G, 9.3 CM	734 H	1.05.7.1 1.05.7.1	1,150	311758	83
	Procambarus clarkii: Red swamp crayfish;	ADULT, 24.8G, 9.3 CM	843 H	LC_{50}	1,090	311758	83
	Procambarus clarkii; Red swamp crayfish;	ADULT, 24.8G, 9.3 CM	945 H	$^{\mathrm{LC}_{50}}$	1,000	311758	83
	Procambarus clarkii; Red swamp crayfish;	EMBRYO	1147 H	$^{LC_{50}}$	206	311758	83
	Procambarus clarkii; Red swamp crayfish;	EMBRYO	1267 H	Γ_{50}°	184	311758	83
	Procambarus clarkii; Red swamp crayfish;	EMBRYO	436 H	ΓC_{50}	3,350	311758	83
	Procambarus clarkii; Red swamp crayfish;	EMBRYO	598 H	LC ₅₀	1,700	311758	83
	Procambarus clarkii; Red swamp crayfish;	EMBRYO	855 H	Γ_{S_0}	1,140	311758	83
	Procambarus clarkii; Red swamp crayfish;	EMBRYO	903 H	LC30	716	311758	83
	Procambarus clarkii; Red swamp crayfish;	EMBRYO	927 H	LC30	556	311758	83
	Procambarus clarkii; Red swamp crayfish;	LARVAE	12 H	LC50	4,170	311758	83
	Procambarus clarkii; Red swamp crayfish;	LARVAE	140 H	ΓC_{50}	527	311758	83
	Procambarus clarkii; Red swamp crayfish;	LARVAE	24 H	ΓC_{50}	1,990	311758	83
	Procambarus clarkii; Red swamp crayfish;	LARVAE	247 H	Γ_{S0}^{C}	242	311758	83
	Procambarus clarkii; Red swamp crayfish;	LARVAE	344 H	LC30	199	311758	83
	Procambarus clarkii; Red swamp crayfish;	LARVAE	456 H	ΓC_{50}	146	311758	83
	Procambarus clarkii; Red swamp crayfish;	LARVAE	48 H	LC ₅₀	1,350	311758	83
	Procambarus clarkii; Red swamp crayfish;	LARVAE	504 H	ΓC_{50}	67	311758	83
	Procambarus clarkii; Red swamp crayfish;	LARVAE	H 86	ΓC_{50}	720	311758	83
	Salmo salar: Atlantic salmon;	2-3 YR	H 96	Γ_{50}°	125		72
	Salmo trutta; Brown trout;	78 G. 3RD YR CLASS	53 D	HIS	15		83
	Salvelinus fontinalis; Brook trout;	YEARLING, 14-16 CM, 30-42 G *	720 D	GRO *	9.4		74
	Salvelinus fontinalis; Brook trout;	YEARLING, 14-16 CM, 30-42 G	720 D	HAT	9.4		74
	Salvelmus fontmalis; Brook front;	YEAKLING, 14-10 CM, 30-42G	707/ 2005	MOK .	4.6		4 6
	Salvelinus fontmalis; Brook trout;	YEARLING, 14-16 CM, 30-42 G	7207	KEP.	4.0		74
	Simocephalus vetulus; Water Ilea;	< 24 H	48 H	LC50	2/	311181	84
Íron	Dugesia dorotccephala; Turbellarian, slatworm:	18-20 MM	1H	BEH *	1,000 to 50,000	r	91
	Lenna minor; Duckweed;	20 COLONIES OR 40 FRONDS	40	BC ₅₀ GR	3,700		98
	Oncorhynchus mykiss; Rambow trout, donaldson trout;	EGGS AND LARVA	NR	DVP.	5,700		82
	Salmo trutta; Brown trout;	ALEVIN	X X	MOK:	5,170	31163/	83
	Salmo trutta: Brown front:	EYED EGGS	X X	MOR •			83
	Salmo trutta; Brown trout;	NEWLY HAT ALEVIN	NR	MOR *	3,020	311637	83
	Tilapia sparrmanii; Banded bream;	10.24-99.43 G	2 to 72 H	* 00	88,000	213066	88



Table O.1–9 AQUIRE Freshwater Toxicity Information (µg/L) AOC 57

Remedial Investigation Report

		Devens, Massachusetts						
Chemical Name	Sairsers	Δ.	Fwnoeiire	Hffert	Effect		AQUIRE	Year
Cilcimontarino		24	A THEO TWO	1001107	Lethal	ublethal		Publication
	Astacus astacus; European crayfish;	8-10 CM	2 WK	ENZ *		20	210376	91
	Astacus astacus; European crayfish;	8-10 CM	to 10 WK	HIS		20	210376	91
	Barbus arulius; Barb;	1.24 G	4 D	HIS		200,000 to 400,00	219972	87
	Brachionus calyciflorus; Rotifer,	NEONATE	24 H	ΓC_{50}	> 4,000	;	219385	91
	Brachydanio rerio; Zebra danio, zebralish;	DECHLORIONATED EGG	24 H			7.7	2198/0	08
	Brachydanio rerio; Zebra danio, zebrafish;	EGG	48 H			7.5	219870	80
	Bufo arenarum; Toad;	EMBRYO	24 H	JVL		1,000	213162	96
	Bufo arenarum; Toad;	EMBRYO	24 H	MOR *	1,000		213162	S 1
	Carassus auratus; Goldfish;	UNDERYEARLING	1 WK *	ENZ.		470	315460	11
	Ceriodaphnia retrulata; Water flea;	< 4 H	48 H	TC ₅₀	530		311181	84
	Daphnia magna; Water flea;	< 24 H	48 H	, LC30	4,400		311181	84
	Daphnia pulex; Water flea;	< 24 H	48 H	LCso	5,100		311181	48
	Dugesia dorotœephala; l'urbellarian, llatworm;	18-20 MM	H 1 70	BEH.		100 to 1,000	310581	5 6
	Ungesia tigrma; Iurbeliarian, Ilatworm;	NR Sir	# £	ار ا	160,000		210804	4,
	Hyalella azteca; scud;	NK	d t	15. CH	0,000	000	2117804	08
	Lethna minor; Duckweed; I anomic mithous: Dimakinged:	20 COLOMBS OR 40 FROMDS	* X/X (-/	# CNH		000,0	315460	96
	Microntens dolomieni: Smallmouth bass:	HGG	H 96	MOR *	<=15.900	2	312153	86
	Micropterus dolomieui: Smallmouth bass:	FINGERLING	10 WK	TOC		405	312153	86
	Micropterus dolomieui; Smallmouth bass;	FINGERLING	Q 06	GRO *		405	312153	98
	Micropterus dolomieui; Smallmouth bass;	FINGERLING	90 D	HEM *		405	312153	98
	Micropterus dolomieui: Smallmouth bass:	FINGERLING	H 96	LCs	29,000		312153	98
	Micropterus dolomieui; Smallmouth bass;	SAC FRY, 7 D POST-SPAWN	H 96	MOR*	<=15,900		312153	98
	Micropterus dolomieui; Smallmouth bass;	SWIM-UPFRY, 17D POST-SPAWN	H 96	ΓC_{50}	2,800		312153	98
	Micropterus dolomieui; Smallmouth bass;	SWIM-UP, FRY 17 D POST-SPAWN	H 96	ΓC_{50}	2,200		312153	86
	Micropterus salmoides; Largemouth bass;	NR	24 H	BEH *		1,500	311127	78
	Micropterus salmoides; Largemouth bass;	NR	24 H	RES *		1,050	311127	78
	Myriophyllum spicatum; Water-milfoil;	4 CM APEX	32 D	EC ₅₀ BM *		363,000	212262	74
	Myriophyllum spicatum; Water-milfoil;	4 CM APEX	32 D	EC50BM *		808,000	212262	74
	Myriophyllum spicatum; Water-milfoil;	4 CM APEX	32 D	EC50GR *		725,000	212262	74
	Myriophyllum spicatum; Water—milfoil;	4 CM APEX	32 D	EC50GR *		767,000	212262	74
	Oncorhynchus mykiss; Rainbow trout, donaldson trout;	10.5 G	32 WK	HIS .		1	310573	83
	Oncorhynchus mykiss; Kambow trout, donaldson trout;	150	H 47	HEM:	,	0eT	315/19	8 °
	Oncorhynchus mykiss; Rambow trout, donaldson trout;	4MO, 15G	4 to 72 H	MOK *	110		315/19	8 %
	Oncorhymehus mykiss; Kambow trout, donaldson trout.	4 MO 15 G	4 to 72 H	MOR *	120		315710	78
	Oncorhynchus mykiss; Rainbow trout, donaldson trout;	4 MO, 15 G	4 to 72 H	MOR *	210		315719	78
	Oncorhynchus mykiss; Rainbow trout, donaldson trout;	4 MO, 15 G	4 to 72 H	MOR *	300		315719	78
	Oncorhynchus mykiss; Rambow trout, donaldson trout;	4 MO, 15 G	4 to 72 H	MOR *	470		315719	78
	Oncorhynchus mykiss; Rainbow trout, donaldson trout;	4 MO, 15 G	4 to 72 H	MOR *	490		315719	78
	Oncorhynchus mykiss; Rambow trout, donaldson trout;	4MO, 15G	4 to 72 H	MOR *	200		315719	78
	Oncorhynchus mykiss; Rainbow trout, donaldson trout;	4 MO, 15 G	4 to 72 H	MOR *	22		315719	78
	Oncorhynchus mykiss; Rambow trout, donaldson trout;	4 MO, 15 G	4 to 72 H	MOR *	53		315719	78
	Oncorhynchus mykiss; Rambow trout, donaldson trout;	4 MO, 15 G	4 to 72 H	MOR *	740		315719	78
	Oncorhynchus mykiss; Rambow trout, donaldson trout;	4MO, 15G	4 to 72 H	MOR *	80		315719	78
	Oncorhynchus mykiss; Rainbow trout, donaldson trout;	4 MO, 15 G	4 to 72 H	MOR *	82		315719	78
	Oncorhynchus mykiss; Rainbow trout, donaldson trout;	4 MO, 15 G	4 to 72 H	MOR *	006		315719	78
	Oncorhynchus mykiss; Rambow trout, donaldson trout;	4 MO, 15 G	4 to 72 H	MOR *	910		315719	78
	Oncornynchus mykiss; Kambow trout, aonaiason trout;	750	W. C.	MOK :	1,000	ç	315/19	% F
	Oncornynchus mykiss; Kambow trout, donaldson trout;	0 - 18 MC	2 = 2 WK.	* 2NG		130	315460	77
	Official profits, rambow from, donaidson from;		on with	, cin		170	5105/3	65

Table O.1 – 9 AQUIRE Freshwater Toxicity Information (μ g/L) AOC 57

Remedial Investigation Report Devens, Massachusetts

		Devens, Massachusetts						
Chemical Name	Species	Age	Exposure	Effect	Effect Concentration		AQUIRE Reference	Year
) o	i		Lethal	ıblethal	Number	Publication
Lead (cont.)	Oncorhynchus mykiss: Rainbow trout, donaldson trout;	NEWLY HAT, SACFRY	189 D	ABN •		32	219830	80
()	Oncorbynchise mykiss: Rainbow troat, donaldson trout:	NEWLY HAT, SACFRY	189 D	ENZ.		100	219830	80
	Oncorhynchus mykiss; Rainbow trout, donaldson trout;	NEWLY HAT, SACFRY	189 D	HEM *		100	219830	80
	Pimenhales promelas: Fathead minnow:	JUVENILE	4 W.K	PHY		500 to 1,000	210204	89
	Potamogeton crispus; Curled pondweed;	NR	NR	• ESA		25,000	217552	77
	Salvelinus fontinalis: Brook trout:	6-18 MO	<=2 WK *	ENZ .		06	315460	11
	Simocephalus vetulus; Water slea;	< 24 H	48 H	LC_{50}	4,500		311181	84
Manganese	Aleas: Aleas shutonlankton alea mat	NATURAL COLONY	38D	* dOd	<u></u>	280	212862	69
Maigaicsc	Anabolia namota: Oniver fiv	LARVAE	7.0	THI	2.000.000		210725	57
	Chicacomis thimmi: Midge:	LARVAE	C.	LET	1.000,000		210725	22
	Curtificate: Minnow carn family:	1 STIMMER	2.25 H	· LEI	1,000,000		210725	57
	Corrinidae: Minnow cam family:	1 SUMMER	24 H	· LET	2,000,000		210725	57
	Cyrinidae: Minnow carp family:	1 SUMMER	25 H	LET	1,800,000		210725	2.7
	Overnidae: Minnow, care family:	1 SUMMER	4.17 D	LET	800,000		210725	ST
	Cyprinidae; Minnow, carp family;	1 SUMMER	5.13 D	. TET	700,000		210725	23
	Oprinidae; Minnow, carp family;	1 SUMMER	6.63 D	LET.	650,000		210725	57
	Cyprinidae; Minnow, carp family;	1 SUMMER	7.D	MOR *	000,000		210725	57
	Cyprinidae; Minnow, carp family;	1 SUMMER	78 H	LET.	000,000		210725	57
	Cyprinidae; Minnow, carp family;	2 SUMMERS	48 H	· LET	2,000,000		210725	57
	Gammarus roeseli; Scud;	NR	J.D	LET	70,000		210725	27
	Lemna minor; Duckweed;	20 COLONIES OR 40 FRONDS	4D	ECSOGR		31,000	311789	98
	Oncorhynchus mykiss; Rainbow trout, donaldson trout;	1 SUMMER	10 H	TEL.	700,000		210725	57
	Oncorhynchus mykiss; Rainbow trout, donaldson trout;	1 SUMMER	13 H	. TEL	000,009		210725	57
	Oncorhynchus mykiss; Rainbow trout, donaldson trout;	1 SUMMER	34 H	LET.	300,000		210725	57
	Oncorhynchus mykiss; Rambow trout, donaldson trout;	1 SUMMER	Ž (191	100,000		21072	<u> </u>
	Oncorhynchus mykiss; Kambow trout, donaldson trout;	1 SUMMEK	0 F	MOK.	75,000		21012	<u> </u>
	Oncorhynchus mykiss; Rambow trout, donaldson trout;		11/	. I . I	150,000		501017	<u> </u>
	Oncorhynchus mykiss; Kambow trout, donaidson trout;		# ;	197	900,000		210723	÷ 5
	Salvelinus fontinalis; Brook trout;	1 SUMMER	H 51	• • • • • • • • • • • • • • • • • • • •	000,000		52/017	<u> </u>
	Salvelmus fontmalls; Brook trout;	1 SUMMER	H 22 H	1 HT	150.000		21012	15
	Salvelmus Iontimalis; Brook front;	1 SUMMEN	T 54	121	300,000		21072	5 6
	Salvelinus fontinalis, Brook front,		# C	WOB .	300,000		21072	15
	Salvelinus fontinalis, Brook trout,	2 SUMMERS	41 H	LET.	600.000		210725	57
	Tinca tinca: Tench:		48 H	LET.	2,000,000		210725	57
	Tinca tinca; Tench;	1 SUMMER	6.75 D	LET.	1,500,000		210725	57
	Tinca tinca: Tench:	1 SUMMER	7D	MOR •	1,290,000		210725	27
	Tinca tinca; Tench;	1 SUMMER	7D	MOR *	1,300,000		210725	27
	Tinca tinca; Tench;		H 96	LET.	1,800,000		210725	57
	Tinca tinca; Tench;		7D	TEL.	2,000,000		210725	57
	Tubifex tubifex; Tubificid worm;	Z,	7D	IEI.	700,000		210725	27
Mercury	Aedes aegypti; Mosquito	LARVAE	48 H	LC_{50}	290		313255	88
	Algae; Algae, phytoplankton, algal mat	PHYTOPLANKTON	14D	BMS:		100	313109	80 i
	Amoeba sp: Amoeba	N. T.	>1.66 H		200		218981	73
	Anabolia nervosa; Quiver fly	LARVAE	7.0	<u> </u>	2,000		210725	37
	Brachionus calycitionus; Router	NEONALE	24 H	MIO.*	00	Ç	2102017	7 2
	Carassius auratus: Goldfish	N N N	8D	RSD •		230	219568	71
(Carassius auratus; Goldfish	15-25G	to 15D	• DIO •		50	219207	72



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Table 0.1–9 AQUIRE Freshwater Toxicity Information ($\mu g/L$) AOC 57

Remedial Investigation Report Devens, Massachusetts

Chemical Name

Mercury (cont.)

		Devens, Massachusetts					
	Sami	Α στο	Hwangire	Hffect	Effect	AQUIRE	Year
	Shortes	9	ancoder		Lethal Sublethal	Number	Publication
Caridina rajadhari: Freshwater nrawn	hwater nrawn	NR	48 H	LCe	6.918	311025	85
Caridina rajadhari; Freshwater prawn	hwater prawn	NR	72 H	ron Lon	5,784	311025	85
Caridina rajadhari; Freshwater prawn	hwater prawn	NR	24 H		9.12	311025	85
Caridina rajadhari; Freshwater prawn	hwater prawn	STAGE C, 2.5 CM	30 D	HIS * (Calc)	0.51		85
Caridina rajadhari; Freshwater prawn	hwater prawn	NR	H 96	ΓC_{50}	4.786		85
Catostomus commersoni; White sucker	i; White sucker	JUVENILE, 142 MM, 28.7 G	1 WK	RSD	190		87
Chironomus plumosus; Midge	Midge	LARVA-STATE L3	24 H	LCso	2,430	215356	68
Chironomus plumosus; Midge	Midge	LARVA-STATE L3	72 H		1,360	215356	S (8
Chironomus plumosus; Midge	Midge	LARVA-STATE L3	48 H	S S	1,760	215356	80
Chironomus plumosus; Midge	Midge	LARVA-STATE L4	48 H	i S	1,280	215350	68
Chironomus plumosus; Midge	Midge	LARVA-STATE L4	H 96	ري. : دې	880	215350	68 °
Chironomus plumosus; Midge	Midge	LARVA-STATE L3	H 96	LCso	000	215350	200
Chirchomus plumosus; Midge	Midge	LARVA-STATE L4	24 H	ညီ ပ	3,230	215350	58 80
Chirchomus plumosus; Midge	Midge	LAKVA-SIAIE L4	H 7/	۶. د	880	213330	ŝ
Chironomus plumosus; Midge	Midge	LARVA-SIAIE L1	24 H	, C50	3,180	213330	8
Chirchomus riparius; Midge	idge	LARVA-SIATE L3	H 2/	LCso	230	215350	68
Chirchomus riparius; Midge	idge	LARVA-SIATE L2	H 2/	ိ ^န ်း ကို	260	213336	68
Chironomus riparus; Midge	1dge	LAKVA-SIAIE L2	H 84	در	020	213330	8 6
Chironomus riparius; Midge	ıdge	LAKVA-SIAIEL4	48 4 H 5	, , ,	087	213330	8
Chironomus riparius; Midge	ıdge	LAKVA-SIAIE LZ	H +7		1,900	213330	8 8
Chirchomus riparius; Midge	.1dge	LAKVA-SIAIBL3	# F		7,230	213330	8
Chironomus riparius; Midge	idge	LAKVA-SIAIB L1	74 H	ر د کار	1,690	22020	8
Chironomus riparus; Midge	idge	LAKVA-SIAIB L3	48 H	LCS	240	213330	\$ 6
Chironomus riparius; Midge	ıdge	EGGS	H 47 == >	MOR	10,000	213330	6
Chironomus riparius; Midge	idge	LAKVA-SIAIE L2	H 96	5 to 5	220	215556	200
Chicagonia riparius; Miage	iage	1 ADVA - STATE 1 A	H 96 01 /	IC	320	213330	<u> </u>
Chiranamic riparius, Midge	10gc	EGGS.	Z=24 H	MOR *	3.200	215356	68
Chiranamic riparite: Midae	1000	LARVA - STATE 1.3	24 H	10.1	750	215356	8
Chirchomis riparius, Midge	ingo idas	LARVA-STATE 14	H 96	05.07 1.030	480	215356	89
Chirchomis riparius Midge	100 P	LARVA-STATE 14	72.H	00 J	710	215356	80
Chirchomus riparius; Midge	idge	EGGS	7 to 96 H	MOR *	320	215356	68
Chironomus tentans; Midge	idge	LARVA-STATE L1	24 H	ΓC_{50}	2,280	215356	88
Chironomus tentans; Midge	idge	LARVA-STATE L3	H 96	ΓC_{50}	280	215356	89
Chironomus tentans; Midge	idge	LARVA-STATE L3	48 H	$^{ m LC}_{50}$	6,700	215356	89
Chironomus tentans; Midge	idge	LARVA-STATE L2	48 H	LC50	8,040	215356	68
Chironomus tentans; Midge	idge	LARVA-STATE L2	24 H	S. C.	23,400	215356	58
Chironomus tentans; Midge	idge	LARVA-SIATE L4	, H Z/L	ည်း သို့ ပ	3,040	215350	68
Chironomus tentans; Midge	වර්ග ව	LABYA STATE 1.4	H +7	1030	22.500	215356	ŝ
Chironomus tentans; Midge	agni agni	LANVA-SIAIE L+ I ABVA-STATE I 2	ц н уб	δ Σ	240	215356	8
Chironomis tentans: Midge	idoe	LARVA-STATE L4	H 96) 	570	215356	68
Chirchomus tentans: Midge	100	LARVA-STATE 1.3	72.H) (1)	580	215356	68
Chironomus tentans: Midge	idge	LARVA-STATE L4	48 H	LÇ	6,860	215356	88
Chironomus tentans; Midge	dge	LARVA-STATE L2	72 H	LC	570	215356	68
Chironomus thummi; Midge	idge	LARVAE	7.D	LET	3,500	210725	57
Cyclops sp: Cyclopoid copepod	popedod	ADULT	48 H	$^{1}C_{50}$	009	313255	88
Cyprinidae; Minnow, carp family	rp family	1 SUMMER	1D	MOR *	300	210725	27
Cyprinidae; Minnow, carp family	rp family	1 SUMMER	7D	MOR *	700	210725	27
Cyprinidae; Minnow, carp family	rp family	1 SUMMER	H 09	LET.	1,000	210725	57
Cyprinidae; Minnow, carp family	rp famity	SUMMER	H C.8	. 1971	3,000	21012	/c

Table O.1 – 9 AQUIRE Freshwater Toxicity Information (μg/L) AOC 57

Remedial Investigation Report Devens, Massachusetts

Mercury (cont.)

		Devens, Massachusetts	ts					
Chomico I Name	Sairen	ν ν	Hange 176	Hffort	Effect		AQUIRE	Year
Circimonitanno	rondo -)			Lethal	ıblethal	Number	Publication
ury (cont.)	Cyprinidae; Minnow, carp family	1 SUMMER	24.25 H	LET .	1,500	•	210725	57
	Cyprinidae; Minnow, carp family	1 SUMMER	84 H	LET.	800		210725	ST
	Cyprinidae; Minnow, carp family	1 SUMMER	2.5 H	LET.	75,000		210725	57
	Cyprinidae; Minnow, carp family	1 SUMMER	7D	MOR •	290		210725	57
	Oyprinidae; Minnow, carp family	1 SUMMER	4.5 H	LET.	20,000		210725	27
	Cyprinidae; Minnow, carp family	1 SUMMER	7D	MOR *	200		210725	23
	Cyprinidae; Minnow, carp family	2 SUMMERS	58 H	TET.	4,500		210725	57
	Cyprinidae; Minnow, carp lamily	1 SUMMEK	H 52.1	. 131	100,001		21012	ć ;
	Lugesia ugima; lurbeharian, marwonn	AN ON	H 20/	۲. ۱۳	2012		215524	† F
	Gambusia affinis: Mosquitofish	a z	30.0	RCF.	2000	-	315524	, ₅
	Gambusia affinis: Mosquitofish	AN AN	2 % CI %	BCF *		٠,-	315524	92
	Gambusia affinis: Mosquitoffsh	NB NB		BCF *		-	315524	62
	Gammarus roeseli: Scud	N.N.	7D	LET	100	•	210725	57
	Gnathonemus petersii: Electric fish	JUVENILE, 5-20G	20 H	PHY *		100	310685	84
	Lamellidens marginalis; Mussel	5.0-6.0 CM	1 to 30 D	00		500 to 2,000	213776	91
	Lamellidens marginalis; Mussel	5.0-6.0 CM	H 96	LÇ	2,000		213776	91
	Lamellidens marginalis; Mussel	NR	H 96	rc ₅₀	10,000		213311	89
	Lamellidens marginalis; Mussel	5.0-6.0 CM	1 to 30 D	GRO		500 to 2,000	213776	91
	Lamellidens marginalis; Mussel	7 CM	3. to 6.5 H	PHY •		500 to 2,000	213311	89
	Lamellidens marginalis; Mussel	32G	48 H	• 00		5,910	311622	84
	Myriophyllum spicatum; Water – milfoil	4 CM APEX	32 D	EC50GR *		1,200	212262	74
	Myriophyllum spicatum; Water – milfoil	4 CM APEX	32 D	EC ₅₀ BM *		3,400	212262	74
	Myriophyllum spicatum; Water – milfoil	4 CM APEX	32 D	ECSOGR •		12,000	212262	74
	Myriophyllum spicatum; Water-milfoil	4 CM APEX	32D	EC50BM *		4,400	212262	74
	Oncorhynchus mykiss; Rainbow trout, donaldson trout	1 SUMMER	11 H	LET.	200		210725	23
	Oncorhynchus mykiss; Rambow trout, donaldson trout	1 SUMMER	7.0	MOR.	150		210725	57
	Oncorhynchus mykiss; Rambow trout, donaldson trout	2 SUMMERS	24 H	LET.	200		210725	57
	Oncorhynchus mykiss; Rambow trout, donaldson trout	1 SUMMER	5.34 D	TEL.	250		210725	22
	Oncorhynchus mykiss; Rainbow trout, donaldson trout	5.8-15.6 CM, 1.7-52.5 G	2 to 209 D	RSD		48.200	210503	71
	Oncorhynchus mykiss; Rambow trout, donaldson trout	1 SUMMER	13.67 H	LET *	350		210725	27
	Oncorhynchus mykiss; Rambow trout, donaldson trout	1 SUMMER	8.17 H	LET*	800		210725	27
	Planaria sp.; Planarian, flatworm	N.W.	H 9'9	$L\Gamma_{50}$	200		218981	73
	Potamogeton crispus; Curled pondweed	NR	ZZ i	PSE *	4	2,000	217552	£ !
	Salvelinus iontinalis; Brook trout	1 SUMMER	U/	MOK	250		210725	3
	Salvelinus fontinalis; Brook trout	2 SUMMERS	H 88		250		210725	S 5
	Salvelmus fontmails; Brook front	1 SUMMER	71 H	151	930		21012	? .
	Salvellius fontinalis, Diook front	1 STIMMER	4 25 D	* LH.	300		21012	52
	Salvelinus fontinalis: Brook trout	1 STIMMER	16.33 H	I.ET.	800		210725	2.5
	Tilapia mossambica: Mozambique tilapia	7-10 CM. 6-10 G	1 WK	HEM *		4,000	212931	87
	Tilapia mossambica; Mozambique tilapia	7.0-11.8 CM	11 WK	BIO •		10	310166	84
	Tinca tinca; Tench	1 SUMMER	72 H	LET.	1,500		210725	57
	Tinca tinca; Tench	1 SUMMER	7.D	MOR •	1,000		210725	57
	Tinca tinca: Tench	1 SUMMER	7.17 D	LET *	1,100		210725	57
	Tinca tinca; Tench	1 SUMMER	12.58 H	LET *	2,000		210725	27
	Tinca tinca; Tench	1 SUMMER	4.5 H	LET.	50,000		210725	S7
•	Tinca tinca; Tench	1 SUMMER	4.25 D	ET.	1,300		210725	57
	Tinca tinca; Tench Tubifev tubifex: Tubificid worm	2 SUMMERS	4.3 D	TEL	1,500		210725	3 5
	I udilëk tudilës, tudilisia mottit	45	ž	101	2000		41014	÷
•		•					(



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Table 0.1–9 AQUIRE Freshwater Toxicity Information ($\mu g/L$) AOC 57

Remedial Investigation Report Devens. Massachusetts

Selenium

		Devens, Massachusetts						
			ţ	1000	Effect		AQUIRE	Year
Chemical Name	Species	Age	Exposure	- Filed	Lethal	Sublethal	Number	Publication
		MICHAE	74 H	LCs	16,000		219385	91
ijum	Brachionus calycitlorus; Rotifer	NEONALE	10°	DVP*	•	6 to 6,050	210956	06
	Chironomus riparius, Midge	T 427	48 H	EC.IM?		1,790	210956	90
	Chirchomus riparius, Midge	H 70.7	48 H	EC,0IM?		14,300	210956	90
	Cultoninus riparius, minge	D 72/	21D	BCF *		711	210956	06
	Daphnia magna; water ilea	7.4.H	21 D	BCF *		348	210956	06
	Daphnia magna; water mea	<=24 H OLD	48 H	LC	430		215184	80
	Dapinia magna; water mea	MIDDI H INSTAR	48 H	LC	710		210486	80
	Daphnia magna; Water ilea	MUSIC MOTOR	21 D	MOR*	711		210956	06
	Daphnia magna; Water Ilea	MIDDIE INSTAR	H 96	LC	430		210486	80
	Daphnia magna; Water Ilea	MIDDLE INSTAN	21 D	REP *		156	210956	06
	Daphnia magna; Water Ilea	ACTION IN INCHAR	141)	, OI	430		210486	80
	Daphnia magna; Water flea	MIDDLE INSTAR	48 H	MOR*	220		215184	80
	Daphnia magna; Water ilea	7 = 24 II	10.3 WK	REP		280	210486	80
	Daphnia magna; Water îlea	ران رين	4.5	#CF *		85	210956	06
	Daphnia magna; Water flea	<24 H	U 12	# HOH		156	210956	06
	Daphnia magna; Water flea	<24 H	7 17	TO DE		0696	210956	06
	Daphnia magna; Water flea	<24 H	\$ 5 I C	MOB :	1 410		210956	2 8
	Daphnia magna; Water flea	<24 H	U17	* dOM	280		210486	80
	Daphnia magna; Water flea	2D	Aw co	* ADA		٧	210956	06
	Daphnia magna; Water sfea	<24 H	41. C 12.	DED *		348	210956	06
	Daphnia magna; Water slea	<24 H	U17	Jan Jan Jan Jan Jan Jan Jan Jan Jan Jan	VYV	2	215184	80
	Daphnia magna; Water flea	<=24 H OLD	H 47	E 250	200	0.340	210056	6
	Daphnia magna; Water flea	<24 H	48 H	BCS01M ;	•	000 01 01000 1	310581	2 5
	Dugesia dorotocephala; Turbellarian, flatworm	18-20 MM	# ;	. ugg	240	7,000 10 10,000	210486	. 8
	Hyalella azteca; Scud	ADULT	# # 8. \$	\$ C	040		210486	80
	Hyalella azteca; Scud	ADULT	8 H C	ا ا	07		210486	80
	Hyalella azteca; Scud	ADULI	į	10507 120 Ja		2 400	311789	98
	Lenna minor; Duckweed	20 COLONIES OR 40 FRONDS	7 t	40050G		\$ V	310565	8 8
	Lepomis macrochirus; Bluegill	JUVENILE, 40-70 MM TOTAL LENGTH	H \$4	RES .		, v	310565	£ 2
	Micropterus salmoides; Largemouth bass	JUVENILE, 40-70 MM TOTAL LENGTH	48 H	KES.	44 000	,	213174	3 8
	Oncorhynchus kisutch; Coho salmon, silver salmon	FRY, 0.7 G	H 96	လို င	16,900		71217	2 8
	Oncorhynchus kisutch; Coho salmon, silver salmon	FRY, 0.5 G	H 96		24,500		2131/4	S 8
	Oncorhynchus kisutch; Coho salmon, silver salmon	FRY, 0.5G	H 96	05 10 10 10 10 10 10 10 10 10 10 10 10 10	23,800		212174	2 6
	Oncorhynchus kisutch; Coho salmon, silver salmon	FRY, 0.5G	H 96	05. 1.	76,600		213174	8 6
	Oncorhynchus tshawytscha; Chinook salmon	FRY, 0.5G	H 95		00,04		713174	2 6
	Oncorhynchus tshawytscha; Chinook salmon	FRY, 0.5G	H 96		00,00		213174	2 8
	Oncorhynchus tshawytscha; Chinook salmon	FRY, 0.5G	H 06	,	20,900		213174	00
	Oncorhynchus tshawytscha; Chinook salmon	FRY, 0.6 G	H 96	05 1.1	1,000		210486	80
	Pimephales promelas; Fathead minnow	2D, BGG	. H 70	17.50	1,000		210486	80
	Pimephales promelas; Fathead minnow	2D, EGG	7. T.C.	* d.X.C	0000	10.000	210486	80
	Pimephales promelas; Fathead minnow	2D, EGG	*11.58	:-EI	٧.		210486	80
	Pimephales promelas; Fathead minnow	2D, EGG	0. H Co	# TVH	•	40.000	210486	80
	Pimephales promelas; Fathead minnow	2D, EGG	U 110 01 1	GRO		5.000 to 30,000	213930	88
	Pimephales promelas; Fathead minnow	UIO-VC	14 11 *	1T	30.000		210486	80
	Pimephales promelas; Fathead minnow	2D, EGG	14 H	05 7-7		5,000 to 30,000	213930	88
	Piniephales promelas; Fathead minnow	7011	*11.50	1.00	20.000		210486	80
	Pimephales promelas; Fathead minnow	2D, EGG	120 H *	1T.	1		210486	80
-	Pimephales promelas; Fathead minnow	2.D. BGG	12 H *	LI	40		210486	80
	rimephales prometas; radicad milliow	201771	17.D	DVP*		15,000	210486	
	Fimephates prometas, rauteau immow Dimentates prometas: Fathead minnow	2 D. EGG	11 H*	$L\Gamma_{50}$	25,000		210486	80
	rinchiares promotes, ranges interest							

Table O.1–9 AQUIRE Freshwater Toxicity Information (µg/L) AOC 57

Remedial Investigation Report

Vanadium oxide sulfate

Zinc

Selenium (cont.)

		Devens, Massachusetts			:			
Chemical Name	Species	40.4	Hwocure	Tiffert	Effect	L	AQUIRE	Year
		254	amender		Lethal	ublethal	Number	or Publication
nium (cont.)	Pimephales promelas; Fathead minnow	FRY, 0.03 G, 17 MM, 25-35 D	14D	7.71	909		ا۔	80
	Pimephales promelas; Fathead minnow	FRY, 0.03 G, 17 MM, 25-35 D	H 96	LC30	1,000		210486	8 8
dina oride aufote	Communication of the party of t		ç	•	1			1
OTHER SPINS THE	Teromic magroching: Bliedill		200	ş.	070'1		552800	6, 9
	Pimenhasles promelas: Fathead minnow	a N	H 96	S. C.	0,000		26/153	00
	Poecilia reticulata: Guony	15-25 CM: 0.1-05 G		200	178		220000	8 8
					071		000677	X
	Algae; Algae, phytoplankton, algal mat;	CLADOCERA, COPEPODA, ROTIFERA	2 WK	CLR *		15 to 30	311256	83
	Algae; Algae, phytoplankton, algal mat;	EXPO GRO PHASE	24 H	PSE		<=98100	213095	80
	Asellus communis; Aquatic sowbug;	NR	20 D	RSD *		0.11 to 0.12	312027) %
	Brachionus calyciflorus; Rotifer,	NEONATE	24 H	COL	1.300		219385	91
	Canthocamptus sp; Copepod;	LARVAE	24 H	LET	1.250		311707	85
	Carassíus auratus; Goldfish;	20-25G	to 15 D	BIO *	•	200	219207	2 8
	Catostomus commersoni; White sucker;	JUVENILE, 142 MM, 28.7 G	1 WK	RSD		890	312412	2 %
	Ceriodaphnia reticulata; Water flea;	H + >	48 H		92		311181	, 8
	Channa punctatus; Snake-head catfish;	2.4 G, 58 MM	24 H	* ZNH		\$6,000	315100	, <u>.</u>
	Chircnomidae; Midge family;	LARVAE	12 MO	d Od		1 140	213176	7 8
	Chironomus riparius; Midge;	4TH INSTAR LARVAE	>10D	RSD		50 to 100	212729	8 8
	Clarias lazera; Catfish;	IMMATURE, 12-15G	2 to 96 H	BIO		32 000	312716	6 %
	Clarias lazera; Catfish;	JUVENILE, 230 MM, 130 G	24 H	RSD •		15.000	312717	, 6
	Cyclops sp; Cyclopoid copepod;	ADULT	48 H		3.310		313255	` ×
	Overis subglobosa: Ostracod:	H. X.	12.H	2,50	47.780		317365	88
	Overis subglobosa: Ostracod:	a w	24 H	200	\$0.620		317365	88
	Oprris subplohosa: Ostracod:	N. N.	48 H	1 1 20	34 000		217365	00
	Opris subglobosa: Ostracod:	i Z	H 96	000 I	8 357		317365	ç 8
	Daphnia lumbolzi: Water flea:	22	12 H	6.01 1.01	2000		312365	¢ 8
	Daphnia lumholzi; Water flea;	A.N.	24 H	851 1	6 704		312303	0 8
	Daphnia lumholzi: Water flea:	N.Y.	48 H		2.290		312365	8 8
	Daphnia lumholzi; Water slea;	N. N.	H 96	8571 1771	437 5		317365	88
	Daphnia magna; Water flea;	24-48 HR, NEONATE	21 D	* CARO		150	213950	3 5
	Daphnia magna; Water flea;	24-48 HR, NEONATE	21 D	MOR	50 to 150		213950	. 5
	Daphnia magna; Water slea;	24-48 HR, NEONATE	21 D	REP		150	213950	. 5
	Daphnia magna; Water flea;	< 24 H	48 H	ÖT	89		311181	84
	Daphnia pulex; Water slea;	< 24 H	48 H		107		311181	. 48
	Dugesia dorotcephala; Turbellarian, flatworm;	18-20 MM	1 H	BEH *		1,000 to 10,000	310581	91
	Dugesia tigrina; Turbellarian, flatworm;	NR	H 96	LCs	7,400	•	218709	7.4
	Gambusia affinis; Mosquitofish;	MIXED SIZES	to 30 D	RSD		20	312897	. ec
	Gambusia assimis; Mosquitosish;	NR	48 H	· LC40?	116		315578	78
	Gammarus lacustris; Scud;	NR	H 96	S.J.	2,240		313058	88
	Gomphonema parvulum; Diatom;	MIXED SPECIES	to 28 D	ABD*		1.000	212397	84
	Hyphessobrycon serpae; Serpa tetra;	JUVENILE & OLDER FISH	14 D	RSD		66,000	212709	78
	Invertebrates; Invertebrates;	CLADOCERA, COPEPODA, ROTIFERA	2 WK	POP*		17.1 to 89.6	311256	83
	Invertebrates; Invertebrates;	CLADOCERA, COPEPODA, ROTIFERA	2 WK	POP*		30 to 90	311256	83
	Lenna minor; Duckweed;	20 COLONIES OR 40 FRONDS	4D	ECSOGR		10.000	311789	98
	Lepomis gibbosus; Pumpkinseed;	15-25G	to 15 D	BIO •		200	219207	72
•	Lepomis macrochirus; Bluegill:	NR	6 M O	MOR *	2,000		212143	73
	Limnodrilus sp.: Sludge worm;	NR	14D	RSD		1,000	311865	83
	Lophopodella carteri; Bryozoa;	ANCENSTRULAE, 2–3 D	H 96	LC30	5,630		216703	80
	Macrobrachium hendersodayanus; Prawn;	N. S. S. S. S. S. S. S. S. S. S. S. S. S.	H 96	* 00		7.870	311545	84
	Myriophyllum spicatim; water – milion;	4 CM APEX	32 D	EC ₅₀ BM *		21.600	212262	74
OUTOX.wkT) ^)	10-Mar-2000



Table O.1–9 AQUIRE Freshwater Toxicity Information (μ g/L) AOC 57

Remedial Investigation Report Devens, Massachusetts

		Devells, 1914 assaultuseus			1		Tours of	;
Chemical Name	Species	Age	Exposure	Effect	Concentration		Reference	of
		þ	4		Lethal	ublethal		Publication
	Myriophyllum spicatum; Water-milfoil;	4 CM APEX	32D	EC.OGR *		20,900	212262	74
	Myriophyllum spicatum; Water-milfoil;	4 CM APEX	32 D	ECAGER *		21,600	212262	74
	Mystus vittatus; Catfish;	80-100 MM, 6-10 G	H 96	LC_{50} ?	209,000		315793	82
Zinc (cont.)	Oncorhynchus mykiss; Rambow trout, donaldson trout;	20-50G	H9	* YHY		2,000	311200	82
	Oncorhynchus mykiss; Rambow trout, donaldson trout;	FINGERLING	12D	RSD *		910 to 2,320	311689	98
	Oncorhynchus mykiss; Rambow trout, donaldson trout;	JUVENILE	to 4 WK	BIO		44 to 140	310107	84
	Oncorhynchus mykiss; Rambow trout, donaldson trout;	NR	48 H	LC ₅₀	2,600		310185	89
	Oncorhynchus mykiss; Rambow trout, donaldson trout;	NR	48 H	$^{\text{LC}_{50}}$	2,800		218317	89
	Oncorhynchus mykiss; Rainbow trout, donaldson trout;	NR	48 H	LC30	3,500		218317	89
	Oncorhynchus mykiss; Rainbow trout, donaldson trout;	SAC-FRY	42 D	GRO *		430	310527	83
	Oncorhynchus mykiss; Rainbow trout, donaldson trout;	SAC-FRY	42 D	MOR •	120		310527	83
	Oncorhynchus mykiss; Rambow trout, donaldson trout;	SAC-FRY	42 D	MOR *	430		310527	83
	Oncorhynchus mykiss; Rambow trout, donaldson trout;	SAC-FRY	42 D	MOR * (Calc)	220		310527	83
	Oncorhynchus mykiss; Rambow trout, donaldson trout;	SAC-FRY	42 D	MOR * (Calc)	80		310527	83
	Osteichthyes; Bony fish class;	ADULT GUPPY, 20-30 MM	48 H	LC ₅₀	2,630		212882	88
	Osteichthyes; Bony fish class;	ADULT GUPPY, 20-30 MM	H 96	LC50	1,860		212882	88
	Osteichthyes; Bony fish class;	JUVENILE GUPPY, 8-15 MM	48 H	LC ₂₀	1,970		212882	88
	Osteichthyes; Bony fish class;	JUVENILE GUPPY, 8-15 MM	H 96	LC ₅₀	1,360		212882	88
	Pectinatella magnifica; Bryozoa;	ANCENSTRULAE, 2-3 D	H 96	LC50	4,310		216703	80
	Phaenopsectra sp; Chironomid;	MIXED SPECIES	to 28 D	ABD*		10,000	212397	84
	Pimephales promelas; Fathead minnow;	NEWLY HAT, < 24 H	7D	GRO *		184	311182	85
	Pimephales promelas; Fathead minnow;	NEWLY HAT, < 24 H	7D	GRO *		85	311182	85
	Pimephales promelas; Fathead minnow;	NEWLY HAT, < 24 H	7D	LC	238		311182	85
	Pimephales promelas; Fathead minnow;	NEWLY HAT, < 24 H	H 96	101	238		311182	85
	Pimephales promelas; Fathead minnow;	SUBADULT, 8-12 WK, <=250 MG	2 to 35 D	GRO*		009	210678	89
	Pimenhales promelas: Fathead minnow:	SUBADULT, $8-12$ WK, ≤ 250 MG	H 96	, DI	2,540		210678	89
	Plumatella emarginata; Bryozoan;	ANCENSTRULAE, 2-3 D	H 96	, CT	5,300		216703	80
	Salmo trutta: Brown trout;	N.B.	2 to 40 D	RSD		366 to 832	311216	85
	Tilania snarrmanii: Randed bream:	12.13-81.77G	2 to 72 H	* 20		98.000	213066	88
	Tilania zillii: Tilania:	IMMATURE, 7-9G	2 to 96 H	BIO *		22,000	312716	87
	Tubifex sp; Tubificid worm;	NR	14D	RSD		1,000	311865	83
	•							
NOTHS								
ABD = Abundance		G = Grams		0	OC = Oxygen consumption	iption		
ABN = Abnormalities		GR = Growth		æ,	PGR = Population growth	owth		
BCF = Bioconcentration factor		GRO = Growth		A.	PHY = Physiological effects	effects		
BEH = Behavioral change		H = Hours		<u>r</u> .	POP = Population, species diversity	ecies diversity		
BIO = Biochemical effect		HAT = Hatchability		Ā	PSE = Photosynthesis effect	effect		
BM = Biomass		HEM = Hematological effect		R	RE = Reproduction			
BMS = Biomass		HIS = Histological effect		64	REP = Adverse effect to reproduction	to reproduction		
C = Celcius		IM = Immobilization		щ	RES = Respiratory effects	fects		
CLR = Chlorophyll content		LC_{50} = Lethal concentration to 50% of test organisms	rganisms	~ 1	RN = Renewel			
CM = Centimeter		LET = Lethality		≃ 4 ≀	RSD = Residue			
D = Days		LOC = Locolilotof Benavious		n t	T = Static			
$EC_{50} = Ellect$ of concentration to 30% of the population	to 50% of the population	L1 ₅₀ = Lethal infeshold to 50% of test organisms	ISITIS	Λ F	SIK = Sifess THI = Thermal offert			
DMS = Dinergance:		MOD - Mosts lite		•	Int = Inclinatenter VIB = Vertebral effect	. 1		
ENL = Enzyme ellect		MON = Mottanty ND = Not reported		> =	vic = veiteblaiellet naf = Missossam ser liter	r 15ter		
r = ratement		ואני – ואטן וכהסטונים		1.	איז ביואסואמייי ביוא	HICE		

= Lowest effect concentration (if a range is provided, the low end of the range is the lowest effect concentration).

Remedial Investigation Report

		Dever	Devens, Massachusetts	usetts		
	Species Identification			Effects		
Chemical Name (((Organism)	Age/Life Stag Regimen		Concentration	Effect	Source
INORGANIC COMPOUNT	8					
Aluminum	Bufo americanus; American toad	Tadpole	96 h	0.627 mg/L	LCso	Devillers & Exbrayat, 1992
	Bufo americanus; American toad	Tadpole	96 h	0.859 mg/L	LC ₅₀	Devillers & Exbrayat, 1992
	Bufo americanus; American toad	Tadpole	96 h	1.379 mg/L	LC ₅₀	Devillers & Exbrayat, 1992
	Bufo americanus; American toad	Tadpole	96 h	1.663 mg/L	LCso	Devillers & Exbrayat, 1992
	Bufo americanus; American toad	Tadpole	96 h	>1.762 mg/L	LC ₅₀	Devillers & Exbrayat, 1992
	Rana pipiens; Northern leopard frog	Embryo	96 h	0.811 mg/L	LC ₅₀	Devillers & Exbrayat, 1992
	Rana pipiens; Northern leopard frog	Embryo	96 h	0.403 mg/L	LC ₅₀	Devillers & Exbrayat, 1992
	Rana pipiens; Northern leopard frog	Embryo	96 h	>0.856 mg/L	LCso	Devillers & Exbrayat, 1992
	Rana pipiens; Northern leopard frog	Embryo	96 h	>1 mg/L	LC ₅₀	Devillers & Exbrayat, 1992
	Rana pipiens; Northern leopard frog	Embryo	96 h	>0.980 mg/L	LCso	Devillers & Exbrayat, 1992
	Rana pipiens; Northern leopard frog	Embryo	96 h	>1.018 mg/L	LC ₅₀	Devillers & Exbrayat, 1992
	Rana pipiens; Northern leopard frog	Embryo	96 h	0.471 mg/L	LCso	ЕСОТОХ
Aluminum chloride	Microhyla carolinensis; Narrow mouthed fro	Eggs	2 d	0.050 mg/L	LC ₅₀	AQUIRE; 215305
	Ambystoma opacum; Marbled salamander	Eggs	8 d	2.28 mg/L	LC ₅₀	AQUIRE; 216199
Bervillum Sulfate	Ambystoma maculatum: Spotted salamand Larva	Larva	24. 48. and	24, 48, and 31.5 mg/L Be	TLs	Devillers & Exbravat. 1992
•	-	evre l	4 96	3 15 mg/l Be	: : -	Devillers & Exhravat 1992
			מ	18.2 mg/L Bo	11.	Devillers & Exhravet 1992
				0.52 mg/c De	1-50	Deviller & Extract 4000
		Larva	- G	8.02 mg/L Be	1 L50	Devillers & Exbrayat, 1992
			48 and 96	18.2 mg/L Be	TL ₅₀	Devillers & Exbrayat, 1992
		Larva	96 h	8.32 mg/L Be	TL ₅₀	Devillers & Exbrayat, 1992
		Larva	2 4 h	6.83 mg/L Be	TL ₅₀	ЕСОТОХ
	Ambystoma maculatum; Spotted salamand	Larva	48 h	4.21 mg/L BE	LC ₅₀	ЕСОТОХ
	Ambystoma maculatum; Spotted salamand	Larva	24 and 48	>10 mg/L Be	TL ₅₀	ЕСОТОХ
	Ambystoma maculatum; Spotted salamand	Larva	24 h	21.2 mg/L	TLso	ЕСОТОХ
	Ambystoma opacum; Marbled salamander	Larva	24, 48, and	31.5 mg/L Be	TL ₅₀	Devillers & Exbrayat, 1992
	Ambystoma opacum; Marbled salamander	Larva	96 h	3.15 mg/L Be	TL ₅₀	Devillers & Exbrayat, 1992
	Ambystoma opacum; Marbled salamander	Larva	24 h	23.7 mg/L Be	TL ₅₀	ЕСОТОХ
	Ambystoma opacum; Marbled satamander	Larva	48 h	4.21 mg/L Be	TLso	Есотох
Cadmium Acetate	Notophthalmus viridescens; Eastern newt	N A	25 d	3.5 mg/L	Mortality	AQUIRE
	Notophthalmus viridescens; Eastern newt	NA AN	25 d	4.0 mg/L	Mortality	AQUIRE
	Notophthalmus viridescens; Eastern newt	NA A	25 d	4.5 mg/L	Mortality	AQUIRE
	Notophthalmus viridescens; Eastern newt	ΝΑ		2.0 mg/L	Mortality	AQUIRE
	Notophthalmus viridescens; Eastern newt	ΑĀ	25 d	2.5 mg/L	Mortality	AQUIRE
	Notophthalmus viridescens; Eastern newt	NA	55 d	3.0 mg/L	Mortality	AQUIRE
	Notophthalmus viridescens; Eastern newt	ΑA	51 d	2.25 mg/L	Mortality	AQUIRE
	Notophthalmus viridescens; Eastern newt	ΑA	51 d	4.5 mg/L	Mortality	AQUIRE
	Notophthalmus viridescens; Eastern newt	ΑN	51 d	6.75 mg/L	Mortality	AQUIRE
	Notophthalmus viridescens; Eastern newt	NA A		2.0 mg/L	Regeneration capabilities	AQUIRE
•	Notophthalmus viridescens; Eastern newt	NA	76 d	2.25 mg/L	Regeneration capabilities	AQUIRE





Remedial Investigation Report Devens, Massachusetts

		Devel	Pevells, massacillasens	Macris		
	Species Identification	Act of the Chan	Exposure Effects	Effects	1000	
Cnemical Name	(Organism)	Age/Lile Stag	Regimen	Concern ation	Ellect	Source
Cadimum Chloride	Xenopus laevis; Clawed toad	3-4 weeks	48 h	3.2 mg/L Cd ²	LC50	Devillers & Exbrayat, 1992
	Xenopus laevis; Clawed toad	2 days	100 d	1.5 mg/L Cd ²⁺	LC ₅₀	Devillers & Exbrayat, 1992
	Ambystoma opacum; Marbled salamander	NA A	8 4	0.15 mg/L	LC ₅₀	AQUIRE
	Bufo arenarum; Argentine toad	ΑN	24 h	3.41 mg/L	LC ₅₀	AQUIRE
	Bufo arenarum; Argentine toad	ΑN	24 h	4.05 mg/L	LC ₅₀	AQUIRE
	Bufo arenarum; Argentine toad	NA	24 h	4.76 mg/L	LC ₅₀	AQUIRE
	Bufo arenarum; Argentine toad	NA	24 h	9.92 mg/L	LC ₅₀	AQUIRE
	Bufo arenarum; Argentine toad	NA A	48 h	2.55 mg/L	LC ₅₀	AQUIRE
	Bufo arenarum; Argentine toad	NA	48 h	3.15 mg/L	LC ₅₀	AQUIRE
	Bufo arenarum; Argentine toad	NA A	48 h	3.4 mg/L	LC ₅₀	AQUIRE
	Bufo arenarum; Argentine toad	NA	48 h	8.6 mg/L	LC ₅₀	AQUIRE
	Bufo arenarum; Argentine toad	NA	72 h	2.32 mg/L	LC ₅₀	AQUIRE
	Bufo arenarum; Argentine toad	NA	72 h	2.87 mg/L	LC ₅₀	AQUIRE
	Bufo arenarum; Argentine toad	NA	72 h	3.11 mg/L	LC ₅₀	AQUIRE
	Bufo arenarum; Argentine toad	NA A	72 h	7.84 mg/L	LCso	AQUIRE
	Bufo arenarum; Argentine toad	ΝΑ	96 h	2.19 mg/L	LC ₅₀	AQUIRE
	Bufo arenarum; Argentine toad	ΝΑ	96 h	2.65 mg/L	LC ₅₀	AQUIRE
	Bufo arenarum; Argentine toad	ΑA	96 h	3.06 mg/L	LC ₅₀	AQUIRE
	Bufo arenarum; Argentine toad	NA	96 h	6.77 mg/L	LC ₅₀	AQUIRE
	Rana pipiens; Northern leopard frog	ΑA	1-2 d	0.307 mg/L	Mortality	AQUIRE
	Rana pipiens; Northern leopard frog	AA A	1 d	0.307 mg/L	Mortality	AQUIRE
	Rana pipiens; Northern leopard frog	NA	1 d	3.068 mg/L	Mortality	AQUIRE
	Rana pipiens; Northern leopard frog	ΝΑ	1 d	4.602 mg/L	Mortality	AQUIRE
	Rana pipiens; Northern leopard frog	NA A	1 d	6.135 mg/L	Mortality	AQUIRE
Cadmium Nitrate	Ambystoma mexicanum; Axolotl	3-4 weeks	48 h	1.3 mg/L	LC ₅₀	Devillers & Exbrayat, 1992
	Ambystoma mexicanum; Axoloti	3-4 weeks	48 h	1.10 mg/L	NOLC	Devillers & Exbrayat, 1992
	Ambystoma mexicanum; Axoloti	A'A	48 h	0.62 mg/L	LC ₅₀	AQUIRE
	Xenopus laevis; Clawed toad	3-4 weeks	48 h	32 mg/L	LC ₅₀	Devillers & Exbrayat, 1992
	Xenopus laevis; Clawed toad	3-4 weeks	48 h	20.2 mg/L	LC ₅₀	Devillers & Exbrayat, 1992
	Xenopus laevis; Clawed toad	3-4 weeks	48 h	23 mg/L	NOLC	Devillers & Exbrayat, 1992
Chromium	Gastrophryne carolinensis; Narrow-					
	mouthed toad	Embryo	96 h	0.03 mg/L	LC ₅₀	Birge et al., 1979
Cobalt	Gastrophryne carolinensis; Narrow- mouthed toad	Embryo	96 h	0.05 mg/L	LC ₅₀	Birge et al., 1979
Copper	Gastrophryne carolinensis; Narrow-			;		
31.0	mouthed toad	Embryo 3.4 mooto	96 h	0.04 mg/L	ري د و	Birge et al., 1979
Copper Sulfate	Aenopus laevis, Clawed toad	3-4 weeks	- 04 	1./ mg/L	ر دو	Devillers & Exbrayat, 1992



Remedial Investigation Report

		Dever	Devens, Massachusetts	nusetts		
	Species Identification		Exposure			
Chemical Name	(Organism)	Age/Life Stag	Regimen	Concentration	Effect	Source
Lead	Bufo americanus; American toad	Tadpole	P 9	0.5 - 1.0 mg/L	Mortality	AQUIRE
	Bufe americanus: American toad	Fmbryo	48 h	0.47 - 0.90 mg/L Pb ²⁺		ECOTOX
		2	: -	i	06) 1	X21201
	Buto arenarum; Argentine toad	Y.	74 h	1.0 mg/L	Emergence	AGUIRE
	Bufo arenarum; Argentine toad	Y Y	24 h	1.0 mg/L	Mortality	AQUIRE
	Gastrophryne carolinensis; Narrow-					
	mouthed toad	Embryo	96 h	0.04 mg/L	LC ₅₀	Birge et al., 1979
Lead Chloride	Ambystoma opacum; Marbled salamander	ΝΑ	8 d	1.46 mg/L	LC ₅₀	AQUIRE
Lead Nitrate	Bufo arenarum: Argentine toad	Embryo	48 h	0.47-0.9 ma/L Pb ²⁺	30	Devillers & Exbravat 1992
	Rana catesbeiana. Bullfron	ĄV	9	05-10 mg/l	l ocomotor behavior	AOUIRE
	Rana clamitans; Green frog	ĄN	1-6 d	0.75 mg/L	Behavior	AQUIRE
Magnesium [f]						
Manganese	Gastrophyna carolinansis: Narrow.					
2000 E	mouthed toad	Embryo	96 h	1.42 mg/L	LC ₅₀	Birge et al., 1979
Mercilia	Bufo fowleri: Fowler's toad	Embroo/l arva	96 h	0.0659 mg/l	2	Devillers & Exhravat 1992
(100)	Bufo punctatus: Red spotted foad	Embryo/Larva	96 h [h]	0.0368 mg/l	3 - C	Devillers & Exhravat 1992
	Control participation of the sported today	Line you Laiva	2 2	0.0000 mg/L	0,0	Devilled & Charact 1992
	mouthed toad	Erribryo/Larva	[a] u oe	0.0013 mg/L	L 50	Deviners & Exbrayat, 1992
	Hyla chrysoscelis: Gray treefron	Embryo/Larva	96 h [h]	0 0024 mg/l	<u>:</u>	Devillers & Exhravat 1992
	Rana divilio. Pid frod	Embryo/Larva	96 h [h]	0.0672 mg/l		Devillers & Exhravat 1992
	Rana pipiens; Northern leopard frog	Embryo/Larva	[q] u 96	0.0073 mg/L	, con	Devillers & Exbravat, 1992
Mercury chloride	Ambystoma mexicanum; Axolotl	3-4 weeks	48 h	0.4 mg/L	; S	ECOTOX
•	Ambystoma mexicanum; Axolotl	3-4 weeks	48 h	0.27 mg/L	NOLC	ЕСОТОХ
17.74						
MICKE	castropringre carolinersis, inarrow- mouthed toad	Embryo	96 h	0.05 mg/L	LC ₅₀	Birge et al., 1979
Silver nitrate	Ambystoma opacum; Marbled salamander	N A	9 q	0.24 mg/L	LC ₅₀	AQUIRE
					:	
Zinc	Gastrophyne carolinensis; Narrow- mouthed toad	Embryo	96 h	0.01 mg/L	l C ₅₀	Birge et al., 1979
Zinc Chloride	Aeriopus idevis, Olaweu todu Ambystoma opacum; Marbied salamander	NA NA	8 d	34.3 mg/L 2.38 mg/L	LC ₅₀	Devillers & Explayat, 1992 AQUIRE
PESTICIDES/PCBs						
4 4'-000	Bufo woodhouses fowler: Fowler's toad	Tadnole	4 90	0.140 mg/l	<u>ئ</u> -	Devillers & Exhravet 1000
	Bufo woodhousei fowleri; Fowler's toad	Tadpole	24 h	0.709 mg/L	LC ₅₀	ECOTOX
4,4'-DDT	Bufo woodhousei fowleri; Fowler's toad	Tadpole 6 wks	96 h	0.10 mg/L	LCso	Devillers & Exbrayat, 1992
	Bufo woodhousei fowleri; Fowler's toad	e 7 wks	96 h	0.03 mg/L	LCso	Devillers & Exbrayat, 1992
	Rana temporaria; Common/Grass frog	Adults	20 d	7.6 mg/kg (dose)	LDso	Devillers & Exbrayat, 1992



Remedial Investigation Report

		Devel	Devens, Massachusetts	nusetts		
	Species Identification		Exposure Effects	Effects		
Chemical Name	(Organism)	Age/Life Stag	Regimen	Concentration	Effect	Source
4	Buto woodbousei fowleri: Fowler's toad	Tadpole	96 h	0.068 mg/L	LC ₅₀	Devillers & Exbrayat, 1992
Addill.	Rana pipiens; Northern leopard frog	3.5 in/ 65 g	30 d	0.30 mg/L	40% Mortality	Devillers & Exbrayat, 1992
		() 4. m d	4 30	0.00271 ma/l	5	Devillers & Exbravat, 1992
Aroclor 1242	Bufo americanus; American toad	Empryo/Larva	[a] 11 os	0.002/ Ling/L		Devillere & Exhravat 1002
	Bufo fowleri; Fowler's toad	Embryo/Larva	[q] u 96	0.01209 mg/L	LC50	Devillers & LADIayat, 1992
Araclar 1254	Bufo americanus: American toad	Embryo/Larva	[q] y 96	0.00202 mg/L	LC ₅₀	AQUIRE; 216//2
10000	Dufe familiari Femiliar's toad	Fmbrvo/Larva	96 h fb1	0.00374 mg/L	LC ₅₀	AQUIRE; 216772
	Dulo lowien, i owiel s toda	1 april 22 mm	12 4	0.025 to 0.050 mg/L	Cytogenetic effects	AQUIRE; 219976
	Pleurodeles waiti, Iberian ribbed riewi	Laivae, 02 IIII	7 00 06 12	0.03818 mg/l	100	AQUIRE: 216772
	Bufo woodhousel towleri; Fowler's toad	Egg, 2-0 11	1000	0.0000 mg/r) <u>.</u>	AOI IIRE: 216772
	Bufo americanus; American toad	Egg, 2-6 h		0.01032 mg/L		AQUIDE: 246772
	Bufo woodhousei fowleri; Fowler's toad	Embryo to larv		0.00374 mg/L	LÇ	AGUIRE, 218772
	Bufo americanus; American toad	Embryo to larv	to 8 d	0.00202 mg/L	LC ₅₀	AQUIRE; 2167 /2
				7	<u>.</u>	Devillers & Exbravat 1992
gamma-BHC (Lindane)	Bufo woodhousei fowleri; Fowler's toad	Tadpole	96 h	3.2 mg/L		Devillers & Extractor, 1992
,	Microhyla ornata; Ornate chorus frog	Yolk plug-stage 96 h	e 96 h	23.37 mg/L	LÇ	Devillers & Exbrayat, 1992
	Microhyla ornata: Ornate chorus frod	Tadpole, 8d	96 h	7.270 mg/L	LC ₅₀	
	Migraphyla ormata: Ormata chorite frod	Yolk plug-stage 96 h	4 96 h	20 mg/L	47% Mortality	Devillers & Exbrayat, 1992
	Microtryla Official, Official Colores in S	Volk plug-stage 48 h	787	20 mg/l	52% Hatch abnormality	Devillers & Exbrayat, 1992
	Micronyla ornata, Ornate cholus nog	Volk plug-stage 96 h	. de .	10 mg/l	12.5% Hatch abnormality	Devillers & Exbrayat, 1992
	Microhyla ornata; Urnate chorus irog	tolk plug-stage	- 400	2 65 mg/l		Devillers & Exbravat, 1992
	Pseudacris triseriata; Chorus frog	tadpoie	= 06	7.60.7 mg/r	1 (50	•
-	Barre minister. Mosthorn Johnson from	3.5in / 65.d	30 d	0.50 ma/L	40% Mortality	Devillers & Exbrayat, 1992
Chiordane	Dana minions: Northern leopaid frod	65 a	30 d	<0.38 mg/L	Mortality	ECOTOX
		9		•		
1977	Bufo woodbousei fowleri: Fowler's toad	Tadpole	96 h	0.15 mg/L	LC ₅₀	Devillers & Exbrayat, 1992
Ufetarin	Dulo Woodillousel towners, I office of town	Todpolo	. 4	0.10 mg/l	Con	Devillers & Exbrayat, 1992
	Pseudacris triseriata, Chorus rrog	ladpole i ii .or	5 6	,	EDS. Mortality	Devillers & Exhravat 1992
	Rana pipiens; Northern leopard frog	3.5in / 65 g	30 d	0.10 mg/L	50% Wortainty	Devineis a Exbiayat, 1992
				-	<u>.</u>	Dovillore & Exhravat 1992
Endrin	Acris crepitans; Cricket frog	Larva	[e] u g6	0.010 mg/L	L 550	Cevilleis & LADiajar, 100E
	Acris crepitans; Cricket frog	Larva	24 h	0.023 mg/L	EC ₅₀	ECOTOX
	Ambystoma maculatum: Spotted salamand	Larva	[e] y 96	0.056 mg/L	LC ₅₀	Devillers & Exbrayat, 1992
	Ambietoma maculatim: Snotted salamand		24 h	0.048 mg/L	EC50	ECOTOX
	Ambyetoma onaciim: Marbled salamander		96 h [e]	0.018 mg/L	LC ₅₀	Devillers & Exbrayat, 1992
	Ambustoma chacim: Marbled salamander	Larva	24 h	0.018 mg/L	EC ₅₀	ЕСОТОХ
	Dufe emorioanie: American toad	l arva	96 h [e]	0.010 mg/L	LC.55	Devillers & Exbrayat, 1992
	Date americanus, American total	87/8	24 h	0.008 mg/L	ECs	ECOTOX
	Buro americanus, American toau	Tadnole	496	0.12 ma/L		Devillers & Exbrayat, 1992
	Buro woodnousel lowier, rowler s toad	Tadpole	96 h [a]	0.18 mg/l	Ces	Devillers & Exbrayat, 1992
	Pseudacris triseriata; Cnorus irog	Tadpole	2.4	0.00 mg/l	25-	ECOTOX
	Pseudacris triseriata; Chorus irog	laupore	24 II	0.00 mg/l		Devillers & Exbravat, 1992
	Rana catesbeiana; Builtrog	Larva	30 H [e]	0.002 flig/L		FCOTOX
	Rana catesbelana; Bullfrog	Larva -	1 4 1	70.040 mg/t	0.50	Devillers & Exhravat 1992
	Rana catesbeiana; Bullfrog	ladpole	H 06	0.0025 mg/L	20% Modelity	Devillers & Exbravat 1992
	Rana pipiens; Northern leopard frog		30 G	0.03 mg/L	50% Moltanty	Devillers & Exhrange 1992
	Rana sphenocephala; Southern leopard fro		24 h	0.025 mg/L		Devillers & Exbragat, 1992
	Rana sphenocephala; Southern leopard fro	Young larva	96 h	0.006 mg/L	LC_{50}	Devillers & Exprayat, 1992

Remedial Investigation Report

		Deven	Devens, Massachusetts	nsetts		
	Species Identification		Exposure	Effects		
Chemical Name	(Organism)	Age/Life Stag	Regimen	Concentration	Effect	Source
Endrin (cont.)	Rana sphenocephala; Southern leopard fro	Older larva	96 h	0.006 mg/L	LC ₅₀	Devillers & Exbrayat, 1992
	Rana sphenocephala; Southern leopard fro	Sub-adult	96 h	0.005 mg/L	LC ₅₀	Devillers & Exbrayat, 1992
	Rana sphenocephala; Southern leopard fro	Larva	96 h [e]	0.009 mg/L	LC ₅₀	Devillers & Exbrayat, 1992
	Rana sphenocephala; Southern leopard fro	Larva	24 h	0.013 mg/L	EC ₅₀	ЕСОТОХ
	Rana sylvatica; Wood frog	Larva	96 h [e]	0.034 mg/L	LC ₅₀	Devillers & Exbrayat, 1992
	Rana sylvatica; Wood frog	Larva	24 h	<0.016 mg/L	EC ₅₀	ЕСОТОХ
	Rana pipiens; Northern leopard frog	65 g	30 d	<0.02 mg/L	Mortality	ЕСОТОХ
Hentachlor	Bufo woodhousei fowleri: Fowler's toad	Tadpole	96 h	0.435 ma/L	Ç	Devillers & Exbravat. 1992
	Bufo woodhousei fowleri; Fowler's toad	Tadpole	24 h	0.844 mg/L	LC ₅₀	ECOTOX
Methoxychlor	Bufo woodhousei fowleri; Fowler's toad	Tadpole 4-5 wk 48 h	48 h	0.100 mg/L	LC ₅₀	Devillers & Exbrayat, 1992
	Bufo woodhousei fowleri; Fowler's toad	Tadpole 4-5 wk 24 h	24 h	0.76 mg/L	LCso	AQUIRE
	Bufo woodhousei fowleri; Fowler's toad	Tadpole 4-5 wk 48 h	48 h	0.11 mg/L	LC ₅₀	AQUIRE
	Pseudacris triseriata; Chorus frog	NA	24 h	0.44 mg/L	LC ₅₀	AQUIRE
	Pseudacris triseriata; Chorus frog	NA	48 h	0.42 mg/L	LCso	AQUIRE
	Pseudacris triseriata; Chorus frog	Y.	96 h	0.33 mg/L	LCso	AQUIRE
Toxaphene	Acris crepitans; Northern cricket frog	Larva	96 h [e]	0.076 mg/L	LC50	Devillers & Exbrayat, 1992
	Ambystoma maculatum; Spotted salamand	Larva	96 h [e]	0.034 mg/L	LC ₅₀	Devillers & Exbrayat, 1992
	Ambystoma opacum; Marbled salamander	Larva	96 h [e]	0.342 mg/L	LC ₅₀	Devillers & Exbrayat, 1992
	Bufo americanus; American toad	Larva	96 h [e]	0.034 mg/L	LC ₅₀	Devillers & Exbrayat, 1992
	Bufo woodhousei fowleri; Fowler's toad	Tadpole	96 h [e]	0.150 mg/L	LC ₅₀	Devillers & Exbrayat, 1992
	Pseudacris triseriata; Chorus frog	Tadpole	96 h	0.390 mg/L	LC ₅₀	Devillers & Exbrayat, 1992
	Rana catesbeiana; Bullfrog	Larva	96 h [e]	0.099 mg/L	LC ₅₀	Devillers & Exbrayat, 1992
· Version Section	Rana pipiens; Northern leopard frog	3.5 in / 63 g	30 d	0.060 mg/L	25% Mortality	Devillers & Exbrayat, 1992
.9	Rana sphenocephala; Southern leopard fro	Egg	96 h	0.060 mg/L	LC ₅₀	Devillers & Exbrayat, 1992
	Rana sphenocephala; Southern leopard fro	E99	96 h	0.046 mg/L	LC ₅₀	Devillers & Exbrayat, 1992
	Rana sphenocephala; Southern leopard fro	Young larva	96 h	0.168 mg/L	LC ₅₀	Devillers & Exbrayat, 1992
	Rana sphenocephala; Southern leopard fro	Young larva	96 h	0.065 mg/L	LC ₅₀	Devillers & Exbrayat, 1992
	Rana sphenocephala; Southern leopard fro	Young larva	96 h	0.032 mg/L	LCso	Devillers & Exbrayat, 1992
	Rana sphenocephala; Southern leopard fro	Sub-adult	96 h	0.378 mg/L	LC ₅₀	Devillers & Exbrayat, 1992
	Rana sphenocephala; Southern leopard fro	Larva	96 h [e]	0.130 mg/L	င်း	Devillers & Exbrayat, 1992
	Rana sylvatica; Wood frog	Larva	96 h [e]	0.195 mg/L	LC ₅₀	Devillers & Exbrayat, 1992
SEMI-VOLATILE ORGANIC COMPOUNDS	IIC COMPOUNDS					
1.2-Dibromomethane	Pleurodeles waltl; Iberian ribbed newt	Larvae, 32 mm 12 d	12 d	1 to 5 mg/L	Cytogenetic effects	AQUIRE; 219976
	Quantitative Structure-Activity Relationship	NA	Ϋ́	540 mg/L	Narcosis	Lipnick, R.L., 1989
2-Proponone	Ambystoma mexicanum; Axoloti	3-4 weeks	48 h	20,000 mg/L	LC ₅₀	AQUIRE; 219740
	Quantitative Structure-Activity Relationship	NA NA	NA A	18,000 mg/L	Narcosis	Lipnick, R.L., 1989





Remedial Investigation Report

			1	Effects		
	Species Identification		Exposure			
Chemical Name	(Organism)	Age/Life Stag		Concentration	Effect	Source
4-Chloroaniline	Xenopus laevis; Clawed toad	Egg stage	3 wk	100 mg/L	Lethality	AQUIRE; 212617
	Xenopus laevis; Clawed toad	Egg stage	3 wk	0.001 mg/L	32% Mortality	AQUIRE; 212617
	Quantitative Structure-Activity Relationship		NA	560 mg/L	Narcosis	Lipnick, R.L., 1989
Anthracene	Rana pipiens: Northern leopard frog	Embryo	24 h [c]	0.065 mg/L	LCsn	Devillers & Exbrayat, 1992
	Rana pipiens: Northern leopard frog	Embryo	24 h [c]	0.11 mg/L	S	Devillers & Exbrayat, 1992
	Rana pipiens; Northern leopard frog	Y.	24 h [d]	0.025 mg/L	LC ₅₀	ECOTOX
	Quantitative Structure-Activity Relationship	NA A	NA V	2.7 mg/L	Narcosis	Lipnick, R.L., 1989
Benzo(a)pvrene	Pleurodeles waltl; Iberian ribbed newt	Larva (3-4 cm)	8 9	0.01 mg/L	TDL0	Devillers & Exbrayat, 1992
	Pleurodeles waltl; Iberian ribbed newt	Larva (3-4 cm)		0.20 mg/L	physiochemical	AQUIRE
	Bufo americanus; American toad	Ϋ́	24 h	5.0 mg/L	Change in Inth and/or wt	AQUIRE
	Rana pipiens; Northern leopard frog		24 h	5.0 mg/L	Change in Inth and/or wt	AQUIRE
	Quantitative Structure-Activity Relationship	Z Z	S S	0.16 mg/L	Narcosis	Lipnick, K.L., 1989
Bis(2-ethvlhexvl)phthalate	Bufo woodhousei fowleri; Fowler's toad	Embryo to lary to 8 d	to 8 d	3.880 mg/L	LC50	AQUIRE; 216772
		Larva	96 h	3.880 mg/L	LC50	AQUIRE; 216772
	Quantitative Structure-Activity Relationship	NA A	NA A	1.7 mg/L	Narcosis	Lipnick, R.L, 1989
Di-n-octylphthalate	Quantitative Structure-Activity Relationship NA	AN A	¥ V	0.0032mg/L	Narcosis	Lipnick, R.L., 1989
Fluoranthene	Rana pipiens: Northern leopard frog	Embryo	24 h [c]	0.09 mg/L	LÇm	Devillers & Exbrayat, 1992
	Quantitative Structure-Activity Relationship		Y Y	1.2 mg/L	Narcosis	Lipnick, R.L., 1989
Nanhthalana	Xenonis faevis: Clawed toad	Larva (3 wks)	4 96 h	2.1 ma/L	10.0	Devillers & Exbravat. 1992
	Version leaves Classed took	ania (3 wike)	. 4	3.7 mg/l	- CE - LE	Dovillors & Exhravat 1992
	Aeriopus laevis, Clawed toad	Laiva (3 Whs)	= .	3.7 iig/r	8 6	Devillers & Exbrayat, 1992
	Xenopus laevis; Clawed toad	Larva (3 wks)	е Р	2.3 mg/L	EC 50	Devillers & Exbrayat, 1992
		Larva (3 wks)	~2 h	4.5 mg/L	Mortality	Devillers & Exbrayat, 1992
	Quantitative Structure-Activity Relationship	A A	Y Y	13 mg/L	Narcosis	Lipnick, R.L., 1989
Nitrobenzene	Rana pipiens; Northern leopard frog	Embryo/Larva	[q] y 96	0.64 mg/L	LC ₅₀	Devillers & Exbrayat, 1992
	Quantitative Structure-Activity Relationship	NA VA	Y Y	420 mg/L	Narcosis	Lipnick, R.L., 1989
N-Nitrosodiphenylamine	Quantitative Structure-Activity Relationship NA	Ą	Ā	57 mg/L	Narcosis	Lipnick, R.L., 1989
Pentachlorophenol	Ambystoma mexicanum; Axoloti	3-4 weeks	48 h	0.3 mg/L	LC ₅₀	Devillers & Exbrayat, 1992
	Ambystoma mexicanum; Axolotl	3-4 weeks	48 h	0.13 mg/L	NOLC	Devillers & Exbrayat, 1992
	Rana catesbeiana; Bullfrog	Tadpole	96 h	0.207 mg/L	LC ₅₀	Devillers & Exbrayat, 1992
	Xenopus laevis; Clawed toad	3-4 weeks	48 h	0.26 mg/L	LC ₅₀	Devillers & Exbrayat, 1992
	Xenopus laevis; Clawed toad	3-4 weeks	48 h	0.21 mg/L	NOLC	Devillers & Exbrayat, 1992
	Xenopus laevis; Clawed toad	< 2 days	100 d	0.032 mg/L	NOLC	Devillers & Exbrayat, 1992
	Organitative Structure-Activity Relationship NA	AN	ΔN	0.22 mg/l	Narcosis	1 innich D 1 1080

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TABLE 0-1.10 SUMMARY OF TOXICITY DATA FOR AMPHIBIAN RECEPTORS [a] AOC 57

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	Species Identification		Exposure	Effects		
Chemical Name	(Organism)	Age/Life Stag	_	Concentration	Effect	Source
Phenol	Ambystoma gracile; Northwestern Salaman	Embryo/Larva	96h	0.38 mg/L	LC ₅₀	Black et al., 1982
	Bufo fowleri; Fowler's toad	Embryo/Larva	96h	2.45 mg/L	LC50	Black et al., 1982
	Rana pipiens; Northern leopard frog	Embryo/Larva	[q] y 96	0.04 mg/L	, c	Devillers & Exbravat, 1992
	Rana palustris; Pickerel frog	Embryo/Larva	96h	9.87 mg/L	LC.	Black et al., 1982
	Rana temporaria; Common/Grass frog	Embryo/Larva	96h	0.27 mg/L	LC.	Black et al., 1982
	Xenopus laevis; Clawed toad	Embryo/Larva	96h	7.68 mg/L	ິວາ	Black et al., 1982
	Xenopus laevis; Clawed toad	Embryo/Larva	96h	51.1 mg/L	LC.	Holcombe et al., 1987
	Quantitative Structure-Activity Relationship	Ϋ́	ΑA	760 mg/L	Narcosis	Lipnick, R.L., 1989
Pyrene	Rana pipiens; Northern leopard frog	Embryo	24 h [c]	0.14 mg/L	LC50	Devillers & Exbrayat, 1992
	Pleurodeles walti; Iberian ribbed newt	Larvae, 32 mm 12 d	12 d	0.035 to 0.2 (F) mg/L	Cytogenetic effects	AQUIRE; 219976
	Quantitative Structure-Activity Relationship NA	X.	X Z	0.5/ mg/L	Narcosis	Lipnick, R.L., 1989
VOLATILE ORGANIC COMPOUNDS	OMPOUNDS					
Acetone	Ambystoma mexicanum; Axolott	3-4 weeks	48 h	20,000 mg/L	LCso	Devillers & Exbrayat, 1992
	Ambystoma mexicanum; Axolotl	3-4 weeks	48 h	12,000 mg/L	NOLC	Devillers & Exbrayat, 1992
	Xenopus laevis; Clawed toad	3-4 weeks	48 h	24,000 mg/L	rc _{so}	Devillers & Exbrayat, 1992
		3-4 weeks	48 h	20,000 mg/L	NOLC	Devillers & Exbrayat, 1992
	Quantitative Structure-Activity Relationship	Ϋ́	Y Y	18,000 mg/L	Narcosis	Lipnick, R.L., 1989
Benzene	Ambystoma mexicanum; Axolotl	3-4 weeks	48 h	370 mg/L	LC ₅₀	Devillers & Exbrayat, 1992
	Ambystoma mexicanum; Axolotl	3-4 weeks	48 h	120 mg/L	NOLC	Devillers & Exbrayat, 1992
	Ambystoma gracile; Northwestern Salaman	Embryo/Larva	96h	5.21 mg/L	LC ₅₀	Black et al., 1982
	Rana pipiens; Northern leopard frog	Embryo/Larva	[q] y 96	3.66 mg/L	LC ₅₀	Devillers & Exbrayat, 1992
	Xenopus laevis; Clawed toad	3-4 weeks	48 h	190 mg/L	LCso	Devillers & Exbrayat, 1992
		3-4 weeks	48 h	105 mg/L	NOLC	Devillers & Exbrayat, 1992
	Quantitative Structure-Activity Relationship NA	Υ	ΑĀ	180 mg/L	Narcosis	Lipnick, R.L., 1989
Bromoform	Quantitative Structure-Activity Relationship NA	¥ X	Š Š	720 mg/L	Narcosis	Lipnick, R.L., 1989
Carbon Tetrachloride	Rana pipiens; Northern leopard frog	Embryo/Larva	[q] y 96	1.64 mg/L	LC ₅₀	Devillers & Exbrayat, 1992
	Rana temporaria; Common/Grass frog	Embryo/Larva	96h	1.16 mg/L	LC ₅₀	Black et al., 1982
	Ambystoma mexicanum; Axolotl	Embryo/Larva	96h	1.98 mg/L	LCso	Black et al., 1982
	Rana palustris; Pickerel frog	Embryo/Larva	96h	2.37 mg/L	LC ₅₀	Black et al., 1982
	Bufo woodhousei fowleri; Fowler's toad	Embryo/Larva	96h	2.83 mg/L	LC ₅₀	Black et al., 1982
	Xenopus laevis; Clawed toad	Embryo/Larva	96h	22.42 mg/L	LCso	Black et al., 1982
	Quantitative Structure-Activity Relationship	Y Y	Y Y	80 mg/L	Narcosis	Lipnick, R.L., 1989
Chlorobenzene	Rana pipiens; Northern leopard frog	Embryo/Larva	[q] 4 96	1.2 mg/L	LC ₅₀	Devillers & Exbrayat, 1992
	Ambystoma gracile; Northwestern Salaman	Embryo/Larva	96h	1.15 mg/L	LC ₅₀	Black et al., 1982
	Quantitative Structure-Activity Relationship	AA	ΔN	59 ma/L	Narcosis	1 innint 0 1 1000



SUMMARY OF TOXICITY DATA FOR AMPHIBIAN RECEPTORS [a] **TABLE 0-1.10** AOC 57

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		Devel	Devells, massacriusells	Insells		
	Species Identification		Exposure Effects	Effects		
Chemical Name	(Organism)	Age/Life Stag	Regimen	Age/Life Stag Regimen Concentration	Effect	Source
Chloroform	Rana pipiens; Northern leopard frog	Embryo/Larva	[q] y 96	4.16 mg/L	LC ₅₀	Devillers & Exbrayat, 1992
	Quantitative Structure-Activity Relationship NA	¥.	Y Y	340 mg/L	Narcosis	Lipnick, R.L., 1989
Dichloromethane	Rana pipiens; Northern leopard frog	Embryo/Larva 96 h [b]	[q] y 96	>48 mg/L	rc ₅₀	Devillers & Exbrayat, 1992
	Quantitative Structure-Activity Relationship	NA	Y Y	1000 mg/L	Narcosis	Lipnick, R.L., 1989
Methylene chloride	Bufo woodhousei fowleri; Fowler's toad	Embryo	b /	> 32 mg/L	EC ₅₀ , teratogenesis	AQUIRE, 1996
	Bufo woodhousei fowleri; Fowler's toad	Embryo	3 d	> 32 mg/L	EC ₅₀ , teratogenesis	AQUIRE, 1996
	Rana catesbeiana; Bullfrog	Embryo	4 d	30.61 mg/L	EC ₅₀ , teratogenesis	AQUIRE, 1996
	Rana catesbeiana; Bullfrog	Embryo	9 q	17.78 mg/L	EC ₅₀ , teratogenesis	AQUIRE, 1996
Toluene	Rana pipiens; Northern leopard frog	Embryo/Larva	[q] y 96	0.39 mg/L	LC ₅₀	Devillers & Exbrayat, 1992
	Quantitative Structure-Activity Relationship	Y Y	Ą	61 mg/L	Narcosis	Lipnick, R.L., 1989
Trichloroethylene	Ambystoma mexicanum; Axolotl	3-4 weeks	48 h	48 mg/L	LC ₅₀	Devillers & Exbrayat, 1992
	Ambystoma mexicanum; Axoloti	3-4 weeks	48 h	29 mg/L	NOLC	Devillers & Exbrayat, 1992
	Xenopus laevis; Clawed toad	3-4 weeks	48 h	45 mg/L	LC ₅₀	Devillers & Exbrayat, 1992
	Xenopus faevis; Clawed toad	3-4 weeks	48 h	41 mg/L	NOLC	Devillers & Exbrayat, 1992
	Quantitative Structure-Activity Relationship	NA A	Ϋ́	160 mg/L	Narcosis	Lipnick, R.L., 1989
o-Xylene	Xenopus laevis; Clawed toad	3-4 weeks	48 h	73 mg/L	LC ₅₀	Devillers & Exbrayat, 1992
	Quantitative Structure-Activity Relationship NA	NA	¥	25 mg/L	Narcosis	Lipnick, R.L., 1989

NOTES:

 LC_{50} = The concentration at which 50% of the population died (exhibited a lethal endpoint).

 $LD_{50} = The administered dose which causes 50% of the population to die.$

 EC_{50} = The concentration at which 50% of the population exhibited an effect.

 TL_{50} = Mortality endpoint; concentration represents the median tolerance limit.

NOLC = No Observed Lethal Concentration

[a] This table is intended to supplement information presented in Table O-1.9.

[b] Initiated at fertilization and maintained through 4 day posthatching.
[c] 30 minutes exposure to the sun
[d] 5 hours exposure to the sun
[e] 5 hours exposure to the sun
[e] A hirmals were exposed to the pesticide for 96 hours, but tabulations of mortality were made at 192 hours to account for delayed effects.
[f] Devillers & Exbrayat (1992) provides synergism data for magnesium and mercury, lead, cadmium, and manganese as % mortality.

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O-2 ECOLOGICAL RISK CALCULATIONS

Estimated Chronic Exposure to Terrestrial Receptors from Ingestion of RME Concentrations of CPCs in Food and Surface Soil Area 2 Upland Table O-2.

Remedial Investigation Report, AOC 57 Devens, Massachusetts

HXPOSTIRE CONCENTRATION DATA

EXPOSURE CONCENTRATION DATA	HON DATA
	RME
ANALYTE	CONCENTRATION
Arsenic	2.1B+01
Cobalt	7.5B+00
Copper	1.6B+01
Manganese	4.8E+02
Nickel	3.1B+01
Selenium	8.8E-01
4,4"-DDE	2.0B-02
4,4'-DDT	2.6B-02
2-Methylnaphthalene	4.3B-01
Bis(2-ethylhexyl)phthalate	2.7B+00
Dibenzofuran	1.6B-01
Fluoranthene	3.0E-01
Naphthalene	4.2B-01
Phenanthrene	2.8B-01
Pyrene	4.0B-01
Chloroform	8.9E-04
Bthylbenzene	2.4B − 03
Tetrachloroethylene	3.0B-03
Toluene	3.7E-03
Trichlorofluoromethane	1.7B-02
Xylenes	2.9E-02

Appendix O-1, Table O-1.2 CPC = Contaminant of Potential Concern

[a] Bioaccumulation data presented in:

[b] CPC concentration s in invertebrate tissue equals the invertebrate BAF multiplied by the RMB soil concentration of the CPC. [c] CPC concentrations in plant tissue equals the plant BAF multiplied by the RME soil concentration of the CPC.

IN PRIMAL	ESTIMATED CONTAMINANT CONCENTRATIONS IN PRIMARY FOOD ITEMS	NCENTRATIONS		BAF VALUES FOR OTHER FOOD ITEMS	SMS
Invert	Concentration in Invertebrate Tissuefbl	Plant	Concentration in Plant Tissue [c]	Small Mammal	Small Bird
	(mg/kg)	BAF[a]	(mg/kg)	BAF(a)	BAF[a]
6.6E-03	1.4B-01	3.0E-01	6.3E+00	1.0B-01	6.0B-03
1.0B+00	7.5B+00	4.0B03	3.0B-02	1.0B+00	1.0E+00
1.6B-01	2.5B+00	7.8B-01	1.2B+01	6.0B-01	6.0B-01
2.0B-02	9.6E+00	5.0B-02	2.4B+01	2.0B-02	2.0B-02
2.3B-01	7.1B+00	1.2B-02	3.7E-01	3.0B01	3.0E-01
7.6B-01	6.7B-01	9.0B-03	7.9B-03	7.5B-01	5.1B-01
1.7B+00	3.3B-02	1.0B-02	2.0B-04	1.2B+00	2.9E+00
5.7B-01	1.5B-02	1.0B-02	2.6B-04	1.2B+00	2.9B+00
5.0B-02	2.2B-02	4.9B-02	2.1B-02	1.5B-01	1.SE-01
S.0B-02	1.4B01	7.6B-03	2.1B-02	2.4B-01	2.4E-01
5.0B-02	8.0E-03	3.3E-02	5.3B-03	1.5B-01	1.5B-01
5.0B-02	1.5B-02	4.9E-02	1.5B-02	1.5B-01	1.5B-01
5.0B-02	2.1E-02	4.9B-02	2.1B-02	1.5B-01	1.5B-01
5.0B-02	1.4B-02	4.9E-02	1.4B-02	1.5B-01	1.5E-01
5.0B-02	2.0B-02	4.9E-02	2.0B-02	1.5B-01	1.5E-01
NA	NA	NA	NA	NA	NA
NA	NA	NA	NA	NA	NA
Ä	NA	NA	NA	NA	NA
NA	NA	NA	NA	NA	NA
NA	NA	NA	NA	NA	NA
NA	NA	NA	NA	NA	NA
					, ,
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				,	

Estimated Chronic Exposure to Terrestrial Receptors from Ingestion of RME Concentrations of CPCs in Food and Surface Soil

Area 2 Upland Remedial Investigation Report, AOC 57 Devens, Massachusetts

POTENTIAL DIETARY EXPOSURE (mg/kgBW/day) [d]

		1-17		
ANALYTE	White-footed mouse	American robin	Red fox	Barred owl
Arsenic	7.3E-01	6.1E-01	2.4E-05	9.0E-05
Cobalt	1.1E-01	3.5E-01	3.7E-05	1.9E-04
Copper	1.4E+00	1.0E+00	9.6E-05	5.6B-04
Manganese	3.9E+00	7.0E+00	2.8E-04	1.5E-03
Nickel	2.0E-01	6.0E-01	4.1E-05	1.8E-04
Selenium	1.1E-02	3.4E-02	3.1E-06	1.2E-05
4,4'-DDE	4.8E-04	1.4E-03	1.9E-07	1.6B-06
4,4'-DDT	2.7E-04	8.2E-04	1.0E-07	9.9E-07
2-Methylnaphthalene	3.6E-03	6.7E-03	3.3E-07	1.8B-06
Bis(2-ethylhexyl)phthalate	1.0E-02	3.5E-02	1.9E-06	1.2B-05
Diberzofuran	1.1E-03	2.3E-03	1.2E-07	6.5B-07
Fluoranthene	2.5E-03	4.6E-03	2.3E-07	1.3E-06
Naphthalene	3.5E-03	6.5E-03	3.3E-07	1.8E~06
Phenanthrene	2.3E-03	4.3E-03	2.2E-07	1.2E-06
Pyrene	3.3E-03	6.2E-03	3.1E-07	1.7E~06
Chloroform	2.2E-06	9.5E-06	4.0E-10	2.6E-09
Ethylberzene	5.9E-06	2.6E-05	1.1E-09	6.9E-09
Tetrachloroethylene	7.3E-06	3.2E-05	1.3E-09	8.7E-09
Toluene	9.1E-06	4.0E-05	1.6E-09	1.1E-08
Trichlorofluoromethane	4.2E-05	1.8E-04	7.6E-09	4,9E-08
Xylenes	7.1E-05	3.1E-04	1.3E-08	8.4E-08

[d] Calculated by summing the products of individual prey type concentrations and percent in diet, multiplying by the ingestion rate, and dividing by body weight (Table 9-27).



Table 0-2.1

Exposure Parameters and Assumptions for Terrestrial Receptors [e] Remedial Investigation Report, AOC 57 Devens, Massachusetts Area 2 Upland

					 _
Body Weight (kg)	0.040	0.077	4.69	0.72	
Food Ingestion Rate (kg/day)	0.0049	0.011	0.24	0.047	
Site Foraging Frequency [g]	1.00B+00	1.00B+00	2.90E-04	8.85E-04	
Si HD[f] Fr	-	0.75	~	1	
	0.147	0.48	1,727	565	
Home Range (acres)					
Soil	7%	10%	3%	2%	
Small Soil Birds	%0	%0	10%	12%	
Percent Prey in Diet Il		•			
Percent Small Mammals	%0	%0	57%	80%	
	88%	51%	10%	%0	
Inverts Plants	10%	33%	20%	3%	
-	(Herb. mammal)	(Omn. bird)	(Predatory mammal)	(Predatory bird)	
Representative Wildlife Species	White-footed mouse	American robin	Red fox	Barred owl	

NOTES:

0.5 acres SITE AREA: Appendix O-1, Table O-1.1 [e] Documentation of exposure parameters presented in:

[f] BD = Bxposure Duration (percentage of year receptor is expected to be found at study area). BD is assumed to be 1 for this risk assessment.

[g] SFF = Site Foraging Frequency (calculated by dividing site area by receptor home range (cannot exceed 1.0)).

Estimated Chronic Exposure to Terrestrial Receptors from Ingestion of Average Exposure Concentrations of CPCs in Food and Surface Soil Area 2 Upland Table O

Remedial Investigation Report, AOC 57

Devens, Massachusetts

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ANALYTE CONCI	AVERAGE
	CONCENTRATION
•	(nig/kg)
Arsenic	1.5E+01
Cobalt	4.6E+00
Copper	1.1E+01
Manganese	2.8E+02
Nickel	1.7B+01
Selenium	2.8B-01
4,4"-DDB	7.0B-03
4,4"-DDT	8.0E-03
2—Methylnaphthalene	2.0B-01
Bis(2-ethylhexyl)phthalate	1.6B+00
Dibenzofuran	8.3E-02
Fluoranthene	1.6B-01
Naphthalene	2.1B-01
Phenanthrene	1.5B-01
Pyrene	1.8E-01
Chloroform	5.3B-04
Ethylbenzene	1.2B-03
Tetrachloroethylene	9.2B-04
Toluene	1.7B-03
Trichlorofluoromethane	7.5B-03
Xylenes	6.4B-03

1.5E-01

1.5B-01

7.4E-03

8.9E-03

4.9B-02

7.5E-03

9.0B-03

1.0E-02

1.5E-01

1.5B-01

6.0E-03 1.0E+00

Small

Small

Concentration in Plant Tissue[c]

ESTIMATED CONTAMINANT CONCENTRATIONS

IN PRIMARY FOOD ITEMS

Invertebrate Tissue [b] Concentration in

(mg/kg)

9.6E-02 4.6E+00 1.8E+00 5.6B+00 3.9B+00 2.1B-01 1.2B-02 4.6B-03 1.0B-02 8.0B-02 4.2B-03 8.0E-03 1.1E-02

6.6E-03 1.0E+00

BAF [a]

1.0E+00

1.8E-02 8.6B+00

6.0B-01

1.0B-01

Матта

OTHER FOOD ITEMS BAF VALUES FOR

2.0E-02

2.0B-02

1.4B+01 2.0B-01

1.2E-02

9.0E-03 1.0E-02 1.0E-02

7.6B-01

1.7B+00

5.7B-01

5.0B-02

5.0B-02 5.0E-02 5.0E-02 5.0E-02 5.0B-02

5.0B-02

7.8E-01 5.0E-02

1.6B-01

2.0E-02

2.3E-01

4.0B-03

3.0E-01

6.0E-01 3.0B-01 5.1E-01 2.9B+00 2.9B+00

1.2B+00

8.0E-05

9.9E-03

4.9E-02

1.2E-02 2.7B-03 7.9E-03

> 3.3E-02 4.9B-02 4.9B-02 4.9B-02

7.6E-03

1.5B-01 2.4B-01 1.5E-01 1.5B-01 1.5B-01

7.5B-01

2.5B-03 7.0B-05

1.2B+00

1.5E-01 2.4B-01 1.5E-01 1.SB-01 1.5E-01

> CPC = Contaminant of Potential Concern [a] Bioaccumulation data presented in:

Appendix O-1, Table O-1.2

¥ A A NA NA A A Ä ¥ ¥ **4 4 4 4 4** ¥

b] CPC concentration s in invertebrate tissue equals the invertebrate BAF multiplied by the average exposure concentration of the CPC. [6] CPC concentrations in plant tissue equals the plant BAF multiplied by the average exposure concentration of the CPC.

Table O--2.2
Estimated Chronic Exposure to Terrestrial Receptors from Ingestion of Average Exposure Concentrations of CPCs in Food and Surface Soil Area 2 Upland
Remedial Investigation Report, AOC 57
Devens, Massachusetts

POTENTIAL DIETARY EXPOSURE (mg/kgBW/day) [d]

ANALYTE White	White-footed mouse	American robin	Red fox	Barred owl	
Arsenic	5.1E-01	4.2E-01	1.7E-05	6.2E-05	
Cobalt	7.0E-02	2.1E-01	2.3E-05	1.2B-04	
Copper	9.7E-01	7.0E-01	6.7E-05	3.9E-04	
Manganese	2.3E+00	4.1E+00	1.7E-04	8.7E-04	
Nickel	1.1E-01	3.3E-01	2.3E-05	1.0E-04	
Selenium	3.6E-03	1.1E-02	1.0E-06	3.9E-06	
4,4'-DDE	1.7E-04	4.9E-04	6.6E-08	5.8E-07	
4,4'-DDT	8.4E-05	2.5E-04	3.2E-08	3.1E-07	
2-Methylnaphthalene	1.7E-03	3.1E-03	1.6E-07	8.4E-07	
Bis(2-ethylhexyl)phthalate	6.2E-03	2.1E-02	1.1E-06	6.9E-06	
Diberzofuran	5.5E-04	1.2E-03	6.1E-08	3.4E-07	
Fluoranthene	1.3E-03	2.5E-03	1.2E-07	6.7E-07	
Naphthalene	1.8E-03	3.3E-03	1.6E-07	8.8E-07	
Phenanthrene	1.3E-03	2.3E-03	1.2E-07	6.3E-07	
Pyrene .	1.5E-03	2.8E-03	1.4E-07	7.6E-07	
Chloroform	1.3E-06	5.7E-06	2.4E-10	1.5E-09	
Ethylberzene	2.9E-06	1.3E-05	5.3E-10	3.5E-09	
Tetrachloroethylene	2.3E-06	9.9E-06	4.1E-10	2.7E-09	
Toluene	4.2E-06	1.8E-05	7.6E-10	4.9E-09	
Trichlorofluoromethane	1.8E-05	8.0E-05	3.3E-09	2.2E-08	
Xylenes	1.6E-05	6.9E-05	2.8E-09	1.8E-08	

[d] Calculated by summing the products of individual prey type concentrations and percent in diet, multiplying by the ingestion rate, and dividing by body weight (Table 9-27).



Exposure Parameters and Assumptions for Terrestrial Receptors [e] Remedial Investigation Report, AOC 57 Area 2 Upland Table O-2.2

Devens, Massachusetts . :

G11117017171717171717171717					
Body Weight (Ag)	0.040	0.077	4.69	0.72	
Food Ingestion Rate (kg/day)	0.0049		0.24		
Site Foraging Prequency [g]	1.00E+00	1.00E+00	2.90B04	8.85E-04	
ED [t]	н	0.75	1	1	
	0.147	0.48	1,727	265	
	2%	10%	3%	2%	
Small Soil Birds	%0	%0	10%	12%	
Percent Prey in Diet - Small Mammals	%0	%0	57%	80%	
	88%	57%	10%	%0	
Inverts Plants	10%	33%	20%	3%	
,	(Herb. mammal)	(Omn. bird)	(Predatory mammal)	(Predatory bird)	
Representative Wildlife Species	White -footed mouse	American robin .	Red fox	Barred owl	

0.5 acres NOTES. SITE AREA: Appendix O-1, Table O-1.1 [e] Documentation of exposure parameters presented in:

[f] BD = Bxposure Duration (percentage of year receptor is expected to be found at study area). BD is assumed to be 1 for this risk assessment. [g] SFF = Site Foraging Frequency (calculated by dividing site area by receptor home range (cannot exceed 1.0)).

Estimated Chronic Exposure to Terrestrial Receptors from Ingestion of RME Concentrations of CPCs in Food and Surface Soil

Remedial Investigation Report, AOC 57 Area 2 Floodplain

Devens, Massachusetts

EXPOSURE CONCENTRATION DATA

RMB CONCENTRATION (mg/g)	1.6E+00	3.9E+01	3.2B+02	4.4B+00	3.4B-02	3.6B+00	2.5B-02	7.7B-01	2.03+00	1.0E+00	2.0E+00	8.1E-03	1.4B-03	5.1B-03	7.2B~03	1.0B-02	1.8B-01	3.8E-01	2.6B-01	6.0E-01	7.1B~01	3.0E-01	6.9E-03	6.7E-02	5.9E-03	4.8B+01	1.1B+02	2.7B+02	1.5B+02
ANALYTE .	Antimony	Copper	Lead	Selenium	4,4°-DDE	Aroclor-1260	Dieldrin	Di-n-butylphthalate	Fluoranthene	Phenanthrene	Pyrene	Methylene chloride	Tetrachloroethylene	Toluene	Trichlorofluoromethane	4,4"-DDD	4,4"-DDT	2-Methylnaphthylene	Acenaphthylene	Benzo(k)fluoranthene	Chrysene	Naphthalene	1,2-Dichloroethylene (cis and trans)	Acetone	Ethylbenzene	Arsenic	Barium	Manganese	Zinc

CPC = Contaminant of Potential Concern

[a] Bioaccumulation data presented in:

Appendix O-1, Table O-1.2

A N A N NA 3.9B-02 5.0B-02 3.3B-02 2.5B+01 2.1B+01 1.4B-01 1.0E-01 1.0E-01 3.5B-02 1.5B-02 8.1E-02 6.3B+00 3.3E+00 1.1B-01 1.0E-01 0.0B+00 0.0E+00 1.9E-02 1.3E-02 3.0E-02 3.3E+00 5.5E+00 5.0E-02 5.0E-02 7.8E-02 Ν NA NA NA NA NA NA 5.0E-02 7.6E-01 5.0B-02 5.0B-02 5.0E-02 5.0B-02 1.6E-01 5.8E+00 3.3E+00 5.7E-01 5.0E-02 5.0压-02 5.0E-02

OTHER FOOD ITEMS BAF VALUES FOR Small

Concentration in

ESTIMATED CONTAMINANT CONCENTRATIONS

IN PRIMARY FOOD LIEMS

Invert Invertebrate Tissue[b]

(mg/kg)

Concentration in

Bird	BAF[a]	5.0E-02	6.0E-01	1.5B-02	5.1B-01	2.9B+00	3.2B01	4.4B-01	2.4B-01	1.5B-01	1.5B-01	1.5B-01	NA	NA	NA	NA	2.9B+00	2.9B+00	1.5B-01	1.5B-01	1.5E-01	1.5B-01	1.5B-01	NA	NA	NA	6.0B-03	7.5E-03	2.0B-02	2.1B+00
Mammal	BAF[a]	5.0E-02	6.0E-01	1.5B-02	7.5B-01	1.2B+00	3.8E+00	1.5E+00	2.4B-01	1.5B-01	1.5B-01	1.5B-01	NA	NA	NA	NA	1.2B+00	1.28+00	1.SB-01	1.5B-01	1.5B-01	1.5B-01	1.5B-01	NA	NA	NA	1.0E-01	7.5B-03	2.015-02	2.1B+00
900000	social.													-																
Plant Tissue [c]	(mg/kg)	6.5B-02	3.1E+01	2.9B+00	4.0B-02	3.4B-04	4.3B-01	4.2B-04	5.9B-03	9.9B-02	4.9B-02	9.9B-02	NA	NA	NA	NA	1.0B-04	1.8B-03	9.6B-03	6.6E-03	1.5E-02	1.8E-02	7.6B-03	0.0E+00	0.0B+00	0.013+00	1.4B+01	3.2B+00	1.4E+01	9.2B+01
Pla																								_	_	_				
Plant	BAF[a]	4.0E-02	7.8E-01	9.0E-03	9.0B-03	1.0B-02	1.2E-01	1.7B-02	7.6B-03	4.9E-02	4.9B-02	4.9B-02	NA	NA	NA	NA	1.0B-02	1.0B-02	2.5B-02	2.5B-02	2.5B-02	2.5E-02	2.5B-02	NA	NA	NA	3.0E-01	3.0E-02	5.0B-02	6.1E-01

0.0E+00 3.2B-01 7.9E-01

> 7.5B-03 2.0B-02 1.8E+00

6.6B-03

[b] CPC concentrations in invertebrate tissue equals the invertebrate BAF multiplied by the RMB soil concentration of the CPC. [c] CPC concentrations in plant tissue equals the plant BAF multiplied by the RMB soil concentration of the CPC.

Estimated Chronic Exposure to Terrestrial Receptors from Ingestion of RME Concentrations of CPCs in Food and Surface Soil Table 0-2.3

Area 2 Floodplain Remedial Investigation Report, AOC 57 Devens, Massachusetts

POTENTIAL DIETARY EXPOSURE (mg/kgBW/day) [d]

Short-tailed shrew	1.0B-02	5.5B-01	2.3B+00	1.3B-01	4.0B-03	7.4B-01	4.8B-03	4.8E-03	1.3B-02	6.4B-03	1.3B-02	3.6B-05	6.2B-06	2.2B-05	3.2E-05	1.2B-03	4.3E-03	2.4B-03	1.6E-03	3.8E-03	4.4E-03	1.9E-03	3.0B∼05	3.0B-04	2.6B-05	3.0E-01	5.1E-01	1.5E+00	1.0E+01
Barred owl	3.0E-06	3.7B-04	5.9B-04	2.7B-05	1.1B-06	4.4B-04	1.2B-06	1.6B-06	4.1B-06	2.1B-06	4.1B-06	1.4B-08	2.4B-09	8.8E-09	1.2B-08	3.2B-07	1.5B-06	7.7B-07	5.2B-07	1.2B-06	1.4B-06	6.0B-07	1.2B-08	1.2B-07	1.0B-08	1.1B-04	1.8B-04	4.9B-04	6.6B-03
Яассооп	8.1B-06	9.8B-04	1.4B-03	4.2B-05	1.0B-06	2.6B-04	1.2B-06	3.3B-06	1.1E-05	5.3E-06	1.1B-05	3.0B-08	5.3B-09	1.9B-08	2.7B-08	3.0B-07	1.6B-06	1.8B-06	1.2B-06	2.8B~06	3.3E-06	1.4B-06	2.6B-08	2.5B-07	2.2E-08	5.2E-04	4.8B-04	1.4B-03	6.0B-03
American robin	1.5B-02	1.6B+00	2.8B+00	1.0E-01	2.7B-03	5.0B-01	3.2B-03	6.2B-03	1.9B-02	9.7B-03	1.9B-02	5.4B-05	9.4B-06	3.4B-05	4.8B-05	8.0E-04	3.5B-03	3.3B-03	2.3B-03	5.3B-03	6.2B-03	2.6B-03	4.6B-05	4.5B-04	4.0B-05	8.8B-01	8.5B-01	2.5B+00	1.0E+01
White-footed mouse	1.2B-02	3.5B+00	1.4B+00	5.6B-02	1.5B-03	3.1B-01	1.8E-03	3.0E-03	1.7B-02	8.4E-03	1.7B-02	2.0B-05	3.4B-06	1.2B-05	1.8B-05	4.4B-04	1.9E-03	2.2E-03	1.SE-03	3.5B-03	4.1B-03	1.7B-03	1.7B-05	1.6B-04	1.4B-05	1.7B+00	6.1B-01	2.2B+00	1.4B+01
ANALYTE	Antimony	Copper	Lead	Selenium	4,4'-DDB	Aroclor-1260	Dieldrin	Di-n-butylphthalate	Fluoranthene	Phenanthrene	Pyrene	Methylene chloride	Tetrachloroethylene	Toluene	Trichlorofluoromethane	4,4'-DDD	4,4'-DDT	2-Methylnaphthylene	Acenaphthylene	Benzo(k)fluoranthene	Chrysene	Naphthalene	1,2-Dichloroethylene (cis and trans)	Acetone	Bthylbenzene	Arsenic	Barium	Manganese	Zinc

[4] Calculated by summing the products of individual prey type concentrations and percent in diet, multiplying by the ingestion rate, and dividing by body weight (Table 9-27).

Exposure Parameters and Assumptions for Terrestrial Receptors [e] Table 0-2.3

Area 2 Floodplain

Remedial Investigation Report, AOC 57 Devens, Massachusetts

Body Weight (kg)	0.040	0.077	3.99	0.72	0.017
Food Ingestion B Rate (kg/day)	0.0049	0.011	0.214	0.047	0.0024
Site Foraging Frequency [g]	1,00E+00	6.25B-01	7.79B-04	5.31B-04	3.12B-01
Si ED [f] Fi	Н	0.75	1		г
	0.147	0.48	385	265	0.96
-Home Range (acres)					
Soli	2%	10%	%6	2%	10%
Small Birds	%0	%0	2%	12%	%0
rey in Diet –					
Percent Prey in Diet Small annmals	%0	%0	19%	80%	% 0
Plants Sn	88%	21%	26%	% 0	12%
Inverts	10%	33%	14%	3%	78%
1	(Herb. mammal)	(Omn. bird)	(Predatory mammal)	(Predatory bird)	(Омп. mammal)
Representative Wildiffe Species	mouse	E*			hrew
Rep	White-footed mouse	American robin	Raccoon	Barred owl	Short -tailed shrew

0.3 acres NOTES: SITE AREA: Appendix O-1, Table O-1.1 [e] Documentation of exposure parameters presented in:

[f] BD = Bxposure Duration (percentage of year receptor is expected to be found at study area). BD is assumed to be 1 for this risk assessment. [g] SFR = Site Foraging Frequency (calculated by dividing site area by receptor home range (cannot exceed 1.0)).

Estimated Chronic Exposure to Terrestrial Receptors from Ingestion of Average Concentrations of CPCs in Food and Surface Soil Area 2 Floodplain

Remedial Investigation Report, AOC 57 Devens, Massachusetts

XPOSURE CONCENTRATION DATA		IN PRIMAR
	Average	
ANALYTE	CONCENTRATION	Invert
	(mg/kg)	 BAF[a]
Antimony	1.6E+00	5.0B-02
Copper	1.6B+01	1.6B-01
Lead	1.4B+02	 7.8E-02
Selenium	1.9B+00	7.6B-01
t,4"-DDE	1.3B-02	3.3B+00
Aroclor-1260	6.3B-01	5.8E+00
Dieldrin	9.9B-03	5.5B+00
Oi—n—butylphthalate	3.3B-01	5.0B-02
Huoranthene	5.8B-01	5.0B-02
Phenanthrene	3.9B-01	5.0B-02
yrene	6.2B-01	5.0B-02
Methylene Chloride	6.8B-03	NA.
<u> Fetrachloroethylene</u>	9.0B-04	NA
Coluene	1.7B-03	NA NA
Crichlorofluoromethane	4.8B-03	NA
i,4"-DDD	7.1B-03	3.3E+00
i,4"-DDT	3,955-02	5.7B-01
2-Methylnaphthalene	1.8B-01	5.0B-02
Acenaphthylene	1.3B-01	5.0B-02
3enzo[k]fluoranthene	2.7B-01	5.0B-02
Chrysene	3.9B-01	5.0B-02
Vaphthalene	1.4B-01	5.0B-02
,2-Dichloroethylene (cis and trans)	3.6B-03	NA
Acetone	2.9压-02	NA
3thylbenzene	3.0E-03	NA
Arsenic	2.4B+01	6.6B-03
Sarium	4.8B+01	7.5B-03
Manganese	1.58+02	2.0B-02
Sinc	5.5B+01	1.8E+00

CPC = Contaminant of Potential Concern [a] Bioaccumulation data presented in:

Appendix O-1, Table O-1.2

2.1E+00 2.0E-02 2.1B+00 2.0E-02 3.4E+01 7.4E+00 5.0E-02 3.0E+00

Ä NA NA

Ä

1.SE-01

1.5B-01

3.6B-03

NA Ν ΝĀ

2.5E-02

7.2B-03

0.0E+00

0.0B+00

0.0E+00

1.6E-01 3.6B-01

1.5压-01

7.5B-03

7.SE-03

1.0E-01

7.2E+00

1.4E+00

3.0压-02

3.05-01

6.0B-03

Ä

A Z Z Z

Ϋ́ A A 1.0B-02

A A ¥

Ϋ́

Ϋ́

4.9E-02

4.9E-02 4.9B-02

> 1.9E-02 3.1E-02

2.9E-02

1.6E-02

ΝĄ Ν ΝA

1.SE-01 1.5B-01 1.5B-01

2.4E-01

2.5E-03 2.9E-02 1.9E-02 3.1E-02 2.9E+00 2.9E+00

1.5B-01 1.5E-01 1.SB-01

1.2B+00

3.9B-04

1.0E-02

2.2B-02 8.8E-03

5.5E-03 1.3E-02 1.9B-02

2.3E-02

2.5E-02 2.5B-02 2.5E-02 2.5E-02

4.5B-03 3.3B-03 6.7E-03 9.8E-03 0.0E+00 0.0E+00 0.0E+00

7.1B-05

1.SE-01 1.5E-01 1.5B-01 1.5B-01

1.2E+00

1.5E-01

2.9B+00

1.2B+00 1.5B+00

1.3E-04 1.7E-04

1.0B-02 1.7B-02 7.6B-03

4.3B-02

1.2E-01

3.8E+00

3.2E-01 4.4B-01 2.4E-01 1.SE-01 1.5E-01

1.5B-02

5.0压-02 6.0E-01 5.1B-01

6.0E-01

1.2E+01

7.8B-01

9.0E-03 9.0E-03

1.1B+01

8.1B-02 2.5B+00 1.4E+00 3.6E+00 5.4E-02

1.3E+00 1.7B-02 7.SB-02

5.0B-02 1.5E-02 7.SE-01

BAF[a] Bird

OTHER FOOD ITEMS BAF VALUES FOR

Small Mammal BAFfaj

Concentration in Plant Tissue [o] (mg/kg)

IMATED CONTAMINANT CONCENTRATIONS

RIMARY FOOD ITEMS Concentration in

nvert Invertebrate Tissue [b]

[b] CPC concentration s in invertebrate tissue equals the invertebrate BAF multiplied by the average soil concentration of the CPC. [c] CPC concentrations in plant tissue equals the plant BAF multiplied by the average soil concentration of the CPC.

Estimated Chronic Exposure to Terrestrial Receptors from Ingestion of Average Concentrations of CPCs in Food and Surface Soil Table O-2.4

Area 2 Floodplain Remedial Investigation Report, AOC 57 Devens, Massachusetts

POTBNTIAL DIETARY EXPOSURE (mg/kgBW/day) [d]

вдзінем																													
Short-tailed shrew	1.0B-02	2.2E-01	1.0B+00	5.8B-02	1.5B-03	1.3B-01	1.9E-03	2.0E-03	3.7B-03	2.5E-03	4.0B-03	3.0B-05	4.0B-06	7.SB-06	2.1B-05	8.4B-04	9.3B-04	1.1B-03	8.1B-04	1.7B-03	2.4B-03	9.0E-04	1.6B-05	1.3B-04	1.3B-05	1.5B-01	2.3B-01	8.05-01	3.8B+00
Barred owl	3.0E-06	1.5E-04	2.6B-04	1.2B-05	4.2B-07	7.7B-05	4.9E-07	6.9B-07	1.2E-06	8.0B-07	1.3E-06	1.2B-08	1.6B-09	2.9B-09	8.3B-09	2.3B-07	3.2B-07	3.5B-07	2.6B-07	5.4B-07	7.8B-07	2.9E-07	6.2B-09	5.0E-08	5.2B-09	5.3B-05	8.4B-05	2.7B-04	2.4B-03
Raccoon	8.1B-06	3.9B-04	6.3B-04	1.8B-05	4.0B-07	4.6B-05	4.8E-07	1.4E-06	3.1E-06	2.1B-06	3.3E-06	2.6B-08	3.4B-09	6.4E-09	1.8E-08	2.2B-07	3.4B-07	8.3E-07	6.1B-07	1.3B-06	1.8E-06	6.8E-07	1.4E-08	1.1B-07	1.1E-08	2.6B-04	2.2B-04	7.5E-04	2.2B-03
American robin	1.5B-02	6.3B-01	1.3B+00	4.5E-02	1.0E-03	8.7E-02	1.3E-03	2.7B-03	5.7E-03	3.8B-03	6.1B-03	4.6B-05	6.0E-06	1.1B-05	3.2E-05	5.7E-04	7.6B-04	1.5B-03	1.1B-03	2.3B-03	3.4B-03	1.3E-03	2.4B-05	1.9E-04	2.0B-05	4.4B-01	3.8E-01	1.3E+00	3.8E+00
White-footed mouse	1.2E-02	1.4B+00	6.3B-01	2.4B-02	5.8B-04	5.4B-02	7.1B-04	1.3E-03	4.9B-03	3.3B-03	5.2E-03	1.7B-05	2.2B-06	4.2B-06	1.2B-05	3.1B-04	4.1B-04	1.0E-03	7.5E-04	1.5B-03	2.2E-03	8.3B-04	d trans) 8.8B-06	7.1B-05	7.3B-06	8.4E-01	2.8B-01	1.2B+00	5.0B+00
ANALYTB	Antimony	Copper	Lead	Selenium	4,4'-DDB	Aroclor-1260	Dieldrin	Di-n-butylphthalate	Fluoranthene	Phenanthrene	Pyrene	Methylene Chloride	Tetrachloroethylene	Toluene	Trichlorofluoromethane	4,4'-DDD	4,4'-DDT	2-Methylnaphthalene	Acenaphthylene	Benzo[k]fluoranthene	Chrysene	Naphthalene	1,2-Dichloroethylene (cis and trans)	Acetone	Bthylbenzene	Arsenic	Barium	Manganese	Zinc

[d] Calculated by summing the products of individual prey type concentrations and percent in diet, multiplying by the ingestion rate, and dividing by body weight (Table 9-27).



Exposure Parameters and Assumptions for Terrestrial Receptors [e] Remedial Investigation Report, AOC 57 Devens, Massachusetts Area 2 Floodplain

|--|

0.3 acres SITE AREA: Appendix O-1, Table O-1.1 [e] Documentation of exposure parameters presented in:

[f] BD = Exposure Duration (percentage of year receptor is expected to be found at study area). BD is assumed to be 1 for this risk assessment. [g] SFF = Site Foraging Frequency (calculated by dividing site area by receptor home range (cannot exceed 1.0)).

15-Mar-2000

Estimated Chronic Exposure to Terrestrial Receptors from Ingestion of RME Concentrations of CPCs in Food and Surface Soil Table O

Area 3

Remedial Investigation Report, AOC 57 Devens, Massachusetts

EXPOSURE CONCENTRATION DATA

CONCENTRATION Not a CPC Not a CPC Not a CPC Not a CPC Not a CPC Not a CPC 8.1B-03 Not a CPC Not a CPC Not a CPC 5.5B+02 1.5B+00 2.5B-02 4.7B-01 4.8B-02 1.1B-01 1.5E-01 1.6B+00 2.7E-01 2.8E-03 2.8E-03 1.2B-02 4.1B+01 1.4B-01 3.0B-03 3.5B-01 4.8B-01 (mg/kg) Bis(2-ethylhexyl)phthalate 1,1,1-Trichloroethane 1,4-Dichlorobenzene 1,2-Dichlorobenzene **Tetrachlorocthylene** gamma-Chlordane alpha-Chlordane Trichloroethylene Chlorobenzene Aroclor-1260 Aroclor-1242 Phenanthrene Fluoranthene Naphthalene Manganese ANALYTE 4,4'-DDE 4,4'-DDT 4,4"-DDD Cadmium Selenium Toluene Arsenic Barium Copper Pyrene Lead Zinc

CPC = Contaminant of Potential Concern [a] Bioaccumulation data presented in:

Appendix O-1, Table O-1.2

ESTIMATED CONTAMINANT CONCENTRATIONS

OTHER FOOD ITEMS BAF VALUES FOR

IN PRIMARY FOOD ITEMS

	Concentration in		Concentration in		Small	Small
Invert Inv	Invertebrate Tissue[b]	Plant	Plant Tissue [c]	Z	Mammal	Bird
BAF[a]	(mg/kg)	BAF[a]	(mg/kg)	8	BAF[a] B	BAF[a]
6.6B-03	2.7B-01	3.0E01	1.2B+01	ਜ	1.0E-01	6.0B-03
7.5B-03	0.0E+00	3.0E-02	0.0B+00	7.	7.5E-03	7.5B-03
1.4B+00	2.1E+00	3.3B+01	5.0E+01	.2	2.1B+00	3.8E-01
1.6B-01	0.0B+00	7.8B-01	0.0B+00	·9	6.0B-01	6.0B-01
7.8E-02	0.0E+00	9.0E-03	0.0B+00	-	1.5B-02	1.5B-02
2.0E-02	1.1B+01	5.0E-02	2.7B+01	- 5	2.0E-02	2.0B-02
1.8E+00	0.0E+00	6.1B-01	0.0B+00	.2	2.1E+00	2.1B+00
1.7B+00	1.3E-02	1.0B-02	8.1B-05		1.2B+00	2.9B+00
5.7E-01	1.4B-02	1.0E-02	2.5E-04		1.2B+00	2.9B+00
5.8B+00	0.0E+00	1.2B-01	0.0B+00	ю́.	3.8E+00	3.2B-01
5.8B+00	2.7E+00	1.2B-01	5.7B-02	£	3.8B+00	3.2B-01
5.0B-02	7.0E-03	4.9B-02	6.9B-03		1.5E-01	1.5E-01
5.0E-02	2.4B-03	4.9B-02	2.4B-03	<u>.</u> ;	1.SB-01	1.5B-01
5.0E-02	5.5B-03	4.9B-02	5.4B-03	-i	1.5B-01	1.5B-01
5.0B-02	7.5B-03	4.9E-02	7.4B-03		1.5B-01	1.5B-01
NA	NA	NA	NA		NA	NA
NA	NA	NA	NA		NA	NA
7.6B-01	1.2B+00	9.0B-03	1.4B-02	7.	7.5B-01	5.1E-01
3.3E+00	8.9B-01	1.0B-02	2.7B-03	-	1.2B+00	2.9B+00
1.6E+00	4.5E-03	5.1B-03	1.4B-05		5.5B-01	1.8E+00
1.6B+00	4.5B-03	5.1B-03	1.4B-05	.5.	5.5B-01	1.8B+00
5.0B-02	1.7B-02	7.3B-02	2,6B-02	-	L.S.B.—01	1.5B-01
5.0E-02	2.4B-02	7.3B-02	3.5E-02	г і 	1.5B-01	1.5B-01
5.0E-02	0.0B+00	7.6B-03	0.0E+00	.2.	2.4B-01	2.4B-01
NA	0.0E+00	NA	0.0B+00	٠	NA	NA
NA	0.0E+00	NA	0.0B+00		NA	NA
NA	0.0E+00	NA	0.0E+00		NA	NA
NA	0.0E+00	NA	0.0B+00		NA	NA

[b] CPC concentration s in invertebrate tissue equals the invertebrate BAF multiplied by the RMB soil concentration of the CPC. [c] CPC concentrations in plant tissue equals the plant BAF multiplied by the RMB soil concentration of the CPC.

Estimated Chronic Exposure to Terrestrial Receptors from Ingestion of RME Concentrations of CPCs in Food and Surface Soil Table O-2.5 Area 3

Remedial Investigation Report, AOC 57 Devens, Massachusetts

POTENTIAL DIETARY EXPOSURE (mg/kgBW/day) [d]

7.9E-05 7.9E-05 7.9E-05 7.9E-05 7.4E-09 3.0E-07 3.4E-03 3.6E-07 3.4E-07 0.0E+00
1.2E-07 1.6E-07 0.0E+00 0.0E+00 2.1E-09 7.5E-10 0.0E+00
0.0E+00 2.1E-09 7.5E-10 0.0E+00
7.5B-10 0.0E+00
0.0E+00

[d] Calculated by summing the products of individual prey type concentrations and percent in diet, multiplying by the ingestion rate, and dividing by body weight (Table 9-27).



Exposure Parameters and Assumptions for Terrestrial Receptors [e] Area 3
Remedial Investigation Report, AOC 57

Remedial Investigation Report, AOC 57 Devens, Massachusetts

200000000000000000000000000000000000000					
Body Weight (#g)	0.040	0.077	4.69	0.72	
Food Ingestion Rate (kg/day)	0.0049	0.011	0.24	0.047	
Site Foraging Prequency [g]	1.00E+00	4.17B-01	1.16E-04	3.54E-04	
S BD[f] F	1	0.75	1		
	0.147	0.48	1,727	565	
Ho	%	10%	3%	5%	
Soil		•			
- Percent Prey in Diet Small Il Small nais Birds	%0	%0	10%	12%	
Small Mammals	%0	%0	21%	80%	
lants	88%	57%	10%	%0	
Inverts	10%	33%	20%	3%	
	(Herb. mammal)	(Omn. bird)	(Predatory mammal)	(Predatory bird)	
Representative Wildlife Species	White-footed mouse	American robin	Red fox	Barred ow!	

NOTES

SITE AREA: 0.2 acres

[e] Documentation of exposure parameters presented in: Appendix O-1, Table O-1.1

[I] BD = Exposure Duration (percentage of year receptor is expected to be found at study area). ED is assumed to be 1 for this risk assessment.

[g] SFR = Site Foraging Frequency (calculated by dividing site area by receptor home range (cannot exceed 1.0)).

Estimated Chronic Exposure to Terrestrial Receptors from Ingestion of Average Exposure Concentrations of CPCs in Food and Surface Soil rable 0-

BAF VALUES FOR

BSTIMATED CONTAMINANT CONCENTRATIONS

7.5B-03 1.4B+00 7.8E-02 1.8B+00

2.0E-02

1.6E-01

S.7B-01

5.8B+00

1.7B+00

5.8E+00

5.0B-02

5.0E-02

5.0B-02

5.0E-02 ¥ ¥ 1.6E+00

1.6E+00

3.3E+00

7.6B-01

5.0B-02 NA NA

5.0B-02

Remedial Investigation Report, AOC 57 Devens, Massachusetts

Area 3

EXPOSURE CONCENTRATION DATA

CONCENTRATION Not a CPC Not a CPC Not a CPC Not a CPC Not a CPC 4.8B-02 1.5B-01 Not a CPC 2.2B+00 2.1B-03 9.3B-01 8.1E-03 1.4E-02 1.4B-01 AVERAGE 2,5E+01 1.2B-01 1.1B-01 1.4E-03 4.8E-01 6.1B-02 2.1B-03 2.1E-031.3E-01 1,6E-01 3.3E-03 1,4-Dichlorobenzene 1,2-Dichloroberzene Tetrachloroethylene gamma-Chlordane Trichloroethylene alpha-Chlordane Chlorobenzene Aroclor-1242 Aroclor-1260 Phenanthrene Fluoranthene Naphthalene ANALYTE Manganese 4,4'-DDE 4,4'-DDD 4,4"-DDT Cadmium Selenium Toluene Arsenic Barium Copper Ругепе Lead Zinc

Appendix O-1, Table O-1.2 CPC = Contaminant of Potential Concern [a] Bioaccumulation data presented in:

[b] CPC concentration s in invertebrate tissue equals the invertebrate BAF multiplied by the average exposure concentration of the CPC. [c] CPC concentrations in plant tissue equals the plant BAF multiplied by the average exposure concentration of the CPC.

Ä A A ΝĄ 2.1B+00 1.8E+00 2.9B+00 2.9B+00 1.8E+00 1.5E-01 3.8E-01 6.0E-01 1.5B-02 2.0B-02 2.9B+00 3.2B-01 1.5E-01 1.SE-01 1.5B-01 1.5B-01 5.1B-01 1.5E-01 3.2B-01 BAF [a] Small OTHER FOOD ITEMS Ā Small 2.1E+00 1.2B+00 3.8B+00 1.5B-01 Ä 5.5B-01 1.5B-01 1.5B-01 BAF[n] 2.1E+00 1.2E+00 Mammal 1.2E+00 3.8E+00 1.5B-01 1.SE-01 7.5B-01 5.5B-01 7.5E-03 6.0B-01 1.5E-02 2.0E-02 1.5E-01 0.0E+00 0.0E+00 NA NA 1.4E-04 Ä ΝĀ 1.1E-02 0.0E+00 0.0E+00 8.1E-05 0.0B+00 1.5B-02 5.4B-03 7.4E-03 4.3E-03 6.1B-04 1.1B-05 1.1B-05 9.4E-03 3.1E+01 1.1E-01 6.9E-03 2.4B-03 Concentration in Plant Tissue [c] (mg/kg) 1.0B-02 A A 3.0E-02 6.1E-01 1.2B-01 4.9B-02 5.1B-03 NA A 7.3E-02 3.3E+01 7.8E-01 9.0B-03 5.0E-02 1.0E-02 1.2B-01 4.9E-02 4.9E-02 1.9E-02 9.0B-03 1.0B-02 5.1B-03 7.3E-02 Inver Invertebrate Tissue[b] Concentration in IN PRIMARY FOOD ITEMS ¥ X 0.0E+00 Ϋ́ Ą 0.0E+00 1.3E + 000.0E+00 7.9E-03 4.4E-02 3.4E-03 7.8E-03 0.0B+00 1.3E-02 0.0E+00 7.0E-01 7.0E-03 2.4B-03 5.5B-03 7.5E-03 3.6B-01 2.0B-01 3.4B-03 6.4E-03 (mg/kg)

Table O-2.6

Estimated Chronic Exposure to Terrestrial Receptors from Ingestion of Average Exposure Concentrations of CPCs in Food and Surface Soil Area 3

Remedial Investigation Report, AOC 57 Devens, Massachusetts

POTENTIAL DIETARY EXPOSURE (mg/kgBW/day) [d]

ANALYTIT Working-record from the control from the c						
n 3.0E-01 1.1B-05 n 3.0E+00 0.0E+00 0.0E+00 0.0E+00 0.0E+00 0.0E+00 0.0E+00 0.0E+00 0.0E+00 0.0E+00 0.0E+00 0.0E+00 0.0E+00 0.0E+00 0.0E+00 0.0E+00 0.0E+00 0.0E+00 0.0E+00 0.0E+00 0.0E+00 0.0E+00 0.0E+00 0.1 1.9E-04 2.4E-04 2.7E-08 0.1 1.0E-04 2.4E-04 2.7E-08 0.1 1.0E-04 2.0E-04 2.0E-08 1.1E-02 0.0E+00 0.0E+00 0.0E+00 1.1E-03 1.1E-04 3.0E-08 1.1E-03 9.0E-04 4.3E-08 1.1E-03 9.0E-04 4.3E-08 1.1E-03 9.0E-04 4.3E-08 1.1E-03 9.0E-04 4.3E-08 1.1E-03 9.0E-04 4.3E-08 1.1E-03 9.0E-04 4.3E-08 1.1E-03 9.1E-04 4.3E-08 1.1E-03 <th></th> <th>e-footed mouse</th> <th>American robin</th> <th>Red fox</th> <th>Barred owl</th> <th></th>		e-footed mouse	American robin	Red fox	Barred owl	
n 0.0E+00 0.0E+00 0.0E+00 0.0E+00 n 3.3E+00 8.0B-01 2.1B-04 cond-40 0.0E+00 0.0E+00 0.0E+00 cse 1.8E-02 1.3E-02 0.0E+00 0.0E+00 0.0E+00 0.0E+00 0.0E+00 0.0E+00 0.0E+00 0.0E+00 0.0E+00 1.1242 0.0E+00 0.0E+00 0.0E+00 1.1242 0.0E+00 0.0E+00 0.0E+00 1.1243 0.0E+00 0.0E+00 0.0E+00 1.1244 1.8E-04 1.8E-04 1.9E-08 1.1245 0.0E+00 0.0E+00 0.0E+00 1.1245 0.0E+00 0.0E+00 0.0E+00 1.1250 0.0E+00 0.0E+00 0.0E+00 1.1245 0.0E+00 0.0E+00 0.0E+00 1.1250 0.0E+00 0.0E+00 0.0E+00 1.1250 0.0E+00 0.0E+00 0.0E+00 1.1250 0.0E+00 0.0E+00 0.0E+00 1.	Arsenic	8.7E-01	3.0E-01	1.1E-05	4.2E-05	
3.3E+00 8.0E-01 2.1E-04 0.0E+00 0.0E+00 0.0E+00 0.0E+00 0.0B+00 0.0E+00 0.0E+00 0.0E+00 1.8E-02 1.3E-02 5.2E-07 0.0B+00 0.0B+00 0.0B+00 0.0E+00 1.9E-04 1.8E-04 1.9E-08 0.0B+00 0.0B+00 0.0B+00 0.0B+00 1.0E-02 1.1E-02 2.0E-06 1.2E-03 3.1E-04 3.4E-08 0.0E+04 7.1E-04 3.4E-08 0.0E+00 0.0B+00 0.0B+00 0.0B+00 0.0B+00 0.0B+00 3.4E-06 6.3E-06 6.3E-06 6.1E-03 3.3E-03 3.3E-03 4.7E-05 5.9E-05 5.5E-09 4.7E-05 5.9E-05 5.5E-08 4.7E-05 5.9E-05 5.5E-08 8.1E-06 6.3E-06 5.5E-08 4.7E-05 5.9E-05 5.5E-08 8.1E-06 1.3E-05 5.3E-08 8.1E-06 5.4E-06 5.3E-06 8.1E-06 5.4E-06 5.3E-06 8.1E-06 5.3E-06 5.3E-08 8.1E-06 5.3E-06 5.3E-08 8.1E-06 5.3E-06 5.3E-08 8.1E-06 5.3E-06 5.3E-08 8.1E-06 5.3E-06 5.3E-08	Barium	0.0E+00	0.0E+00	0.0E+00	0.0E+00	
0.0E+00 0.0E+00 0.0E+00 0.0E+00 0.0E+00 0.0E+00 0.0E+00 0.0E+00 1.8E-02 1.3E-02 5.2E-07 0.0E+00 0.0E+00 0.0E+00 0.0E+00 1.9E-04 2.4E-04 2.7E-08 1.5E-04 1.8E-04 2.7E-08 1.0E-02 1.1E-02 2.0E-08 1.0E-03 9.0E-04 4.3E-08 4.0E-04 3.1E-04 4.3E-08 4.0E-04 3.1E-04 4.3E-08 9.0E-04 7.1E-03 3.4E-08 9.0E-04 4.3E-08 4.6E-08 1.3E-03 9.7E-04 4.6E-08 1.3E-03 7.6B-03 5.5E-08 4.7E-04 5.3E-04 5.5E-09 4.7E-05 5.9E-05 5.5E-09 4.7E-05 5.9E-05 5.5E-09 4.7E-03 5.9E-05 5.5E-09 4.7E-03 5.9E-05 5.5E-08 8.1E-06 7.1E-03 3.7E-10 5.1E-06 3.7E-10	Cadmium	3.3E+00	8.0E-01	2.1E-04	1.1E-03	
0.09+00 0.09+0	Copper	0.0E+00	0.0E+00	0.0E+00	0.0E+00	
1.8E-02 1.3E-02 5.2E-07 0.0E+00 0.0E+00 0.0E+00 1.9E-04 2.4E-04 2.7E-08 1.5E-04 1.8E-04 1.9E-08 0.0B+00 0.0E+00 0.0E+00 1.0B-02 1.1E-02 2.0E-06 1.2B-03 9.0E-04 4.3E-08 1.3E-04 7.1E-04 3.4E-08 0.0E+00 0.0E+0	Lead	0.0E+00	0.0E+00	0.0E+00	0.0E+00	
0.02+00 0.02+00 0.02+00 1.9E-04 2.4E-04 2.7E-08 1.5E-04 1.8E-04 2.7E-08 0.0E+00 0.0E+00 0.0E+00 1.0E-02 1.1E-02 2.0E-06 1.2E-03 9.0E-04 4.3E-08 4.0E-04 7.1E-04 3.4E-08 9.2E-04 7.1E-04 4.6E-08 0.0E+00 0.0E+00 0.0E+00 0.0E+00 0.0E+00 0.0E+00 3.4E-06 6.3E-06 2.5E-10 6.1E-03 7.6B-03 3.8E-07 4.7E-05 5.9E-05 5.5E-09 4.7E-05 5.9E-05 5.5E-09 1.6 1.7E-03 9.1E-04 4.2E-08 8.1E-05 5.9E-05 5.9E-05 8.1E-06 1.5E-05 5.9E-05 8.1E-05 1.5E-05 5.9E-05 8.1E-06 1.5E-05 5.9E-05 8.1E-06 1.5E-05 5.9E-05 8.1E-06 1.5E-05 5.9E-05 8.1E-06 3.7E-10	Manganese	1.8E-02	1.3E-02	5.2E-07	2.6E-06	
1.9B-04 1.8B-04 1.8B-04 1.8B-04 1.0B-02 1.0B-02 1.0B-02 1.1B-02 1.1B-02 1.1B-03 1.1B-03 1.1B-04 4.3B-08 1.3B-03 9.0B-04 4.3B-08 1.3B-03 9.0B-04 4.3B-08 1.3B-03 9.7B-04 4.6B-08 0.0B+00 0.0B+0	Zinc	0.0E+00	0.0E+00	0.0E+00	0.0E+00	
1.5B-04 1.8B-04 1.9B-08 0.0B+00 0.0B+0	4,4'-DDE	1.9E-04	2.4E-04	2.7E-08	1.4E-07	
0.0E+00 0.0B+00 0.0E+00 0.0E+00 1.0E-02 1.1E-02 2.0E-06 1.2E-03 9.0E-04 4.3E-08 4.0E-06 1.3E-04 4.3E-08 1.3E-04 1.3E-08 1.3E-04 1.3E-04 1.3E-08 1.3E-04 1.3E-04 1.3E-08 1.3E-04 1.3E-04 1.3E-08 0.0E+00 0.0E+00 0.0E+00 0.0E+00 0.0E+00 0.0E+00 0.0E+00 1.3E-03 1.3E-0	4,4'-DDT	1.5E-04	1.8E-04	1.9E-08	1.2E-07	
1.0B-02 1.1B-02 1.2B-03 9.0B-04 4.3B-08 4.0B-04 4.3B-08 4.0B-04 3.1B-04 1.1B-04 1.1B-03 1.1B-04 1.1B-08 3.4B-08 0.0B+00 0.0B+0	Aroclor-1242	0.0E+00	0.0E+00	0.0E+00	0.0E+00	
1.2E-03 9.0E-04 4.3E-08 4.0E-08 4.0E-04 3.1E-04 1.5E-08 9.2E-04 7.1E-04 3.4E-08 1.3E-08 1.3E-04 7.1E-04 4.6E-08 0.0E+00 0.0E+0	Aroclor-1260	1.0E-02	1.1E-02	2.0E-06	7.1E-06	
4.0E-04 3.1E-04 1.5E-08 3.4E-08 3.4E-08 1.3E-04 7.1E-04 3.4E-08 3.4E-08 1.3E-04 0.0E+00 0.0E+0	Fluoranthene ·	1.2E-03	9.0E-04	4.3E-08	2.1E-07	
9.2E-04 7.1E-04 3.4E-08 1.3E-03 0.0E+00 0.0E+00 0.0E+00 3.4E-06 6.3E-06 0.0E+00 0.0E+00 3.4E-03 7.6E-03 0.0E+00 2.7E-03 7.6E-03 3.8E-07 4.7E-03 3.3E-03 3.8E-07 4.7E-05 5.9E-05 5.5E-09 4.7E-03 1.1E-04 4.2E-08 4.7E-03 5.9E-05 5.2E-08 4.7E-03 0.1E-04 4.2E-08 5.5E-05 5.9E-05 5.9E-08 5.1E-06 9.4E-06 3.7E-10	Naphthalene	4.0E-04	3.1E-04	1.5E-08	7.2E-08	
1.3E-03 9.7E-04 4.6E-08 0.0E+00 0.0E+0	Phenanthrene	9.2E-04	7.1E-04	3.4E-08	1.7E-07	
0.0E+00 0.0E+0	Pyrene	1.3E-03	9.7E-04	4.6E-08	2.3E-07	
3.4E-06 6.3E-06 2.5E-10 6.1E-03 7.6E-03 6.6E-07 2.7E-03 3.3E-03 3.8E-07 4.7E-05 5.9E-05 5.9E-05 5.5E-09 4.7E-03 9.1E-04 4.2E-08 1.7E-03 1.1E-03 5.2E-08 5.1E-06 9.4E-06 3.7E-10	Tetrachloroethylene	0.0E+00	0.0E+00	0.0E+00	0.0E+00	
6.1E-03 7.6E-03 6.6E-07 2.7E-03 3.3E-03 3.8E-07 4.7E-05 5.9E-05 5.9E-05 5.5E-09 4.7E-03 5.9E-04 4.2E-08 1.7E-03 1.1E-03 5.2E-08 8.1E-06 1.5E-05 5.9E-10 5.1E-06 9.4E-06 3.7E-10	Toluene	3.4E-06	6.3E-06	2.5E-10	1.6E-09	
2.7E-03 3.3E-07 3.3E-07 4.7E-05 5.9E-05 5.9E-05 5.5E-09 4.7E-03 5.9E-05 5.9E-05 5.5E-09 5.9E-05 5.9E-05 5.9E-05 5.9E-09 5.9E-03 5.9E-09 5.9E-08 5.9E-06 5.9E-10 5.1E-06 5.4E-06 3.7E-10	Selenium	6.1E-03	7.6E-03	6.6E-07	2.0E06	
4.7E-05 5.9E-05 5.5E-09 4.7E-05 5.9E-05 5.5E-09 1.4E-03 9.1E-04 4.2E-08 1.1E-03 1.1E-03 5.2E-08 8.1E-06 1.5E-05 5.9E-10 5.1E-06 9.4E-06 3.7E-10	4,4'-DDD	2.7E-03	3.3E-03	3.8E-07	1.9E-06	
4.7E-05 5.9E-05 5.5E-09 1.4E-03 9.1E-04 4.2E-08 1.1E-03 1.1E-03 5.2E-08 8.1E-06 1.5E-05 5.9E-10 5.1E-06 9.4E-06 3.7E-10	alpha-Chlordane	4.7E-05	5.9E-05	5.5E-09	2.2E-08	
icine 1.4E-03 9.1E-04 4.2E-08 icine 1.7E-03 1.1E-03 5.2E-08 8.1E-06 5.9E-10 5.1E-06 9.4E-06 3.7E-10	gamma-Chlordane	4.7E-05	5.9E-05	5.5E-09	2.2E-08	
6ne 1.7E-03 1.1B-03 5.2E-08 5.9E-10 5.1E-06 9.4E-06 3.7E-10	1,2-Dichlorobenzene	1.4E-03	9.1E-04	4.2E-08	2.0E07	
8.1E-06 1.5E-05 5.9E-10 3.1E-06 9.4E-06 3.7E-10	1,4-Dichloroberzene	1.7E-03	1.1E-03	5.2E-08	2.5E-07	
5.1E-06 9.4E-06 3.7E-10	Chloroberzene	8.1E-06	1.5E-05	5.9E-10	3.8E09	
	Trichloroethylene	5.1E-06	9.4E-06	3.7E-10	2.4E-09	

[d] Calculated by summing the products of individual prey type concentrations and percent in diet, multiplying by the ingestion rate, and dividing by body weight (Table 9-27).



Exposure Parameters and Assumptions for Terrestrial Receptors [e] Area 3

Remedial Investigation Report, AOC 57 Devens, Massachusetts

(CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC				
Body Weight (kg.)	0.040	0.077	4.69	0.72
Food Ingestion B Rate (kg/day)	0.0049	0.011	0.24	0.047
Site Foraging Prequency [g]	1.00E+00	4.17B-01	1.16B-04	3.54B-04
S BD[t] F	г	0.75	н	H
	0.147	0.48	1,727	565
Home Range				
Soil	2%	10%	3%	2%
Small Soil Birds	%0	%0	10%	12%
Percent Prey in Diet Small Sn Mammals Bi	960	960	57%	80%
	88%	21%	10%	% 0
Inverts Plants	10%	33%	20%	3%
i	(Herb. mammal)	(Omn. bird)	(Predatory mammal)	(Predatory bird)
Representative Wildlife Species	White -footed mouse	American robin	Red for	Barred owl

NOTBS SITE ARBA:

0.2 acres

[e] Documentation of exposure parameters presented in: Appendix O-1, Table O-1.1

[f] BD = Bxposure Duration (percentage of year receptor is expected to be found at study area). BD is assumed to be 1 for this risk assessment.

[g] SFR = Site Foraging Frequency (calculated by dividing site area by receptor home range (cannot exceed 1.0)).

Table O-27
Estimated Chronic Exposure to Semi-Aquatic Receptors from Ingestion of RME Exposure Concentrations of CPCs in Food, Unfiltered Surface Water, and Sediment Area 2

Remedial Investigation Report, AOC 57 Devens, Massachusetts

EXPOSURE CONCENTRATION DATA

EXPOSURE CONCENTRATION DATA			HSL
	RME	RME UNFILT.	
	SEDIMENT	SURFACE WATER	₹
CHEMICAL	CONCENTRATION	CONCENTRATION	ő
	(mg/kg)	(mg/L)	B
Aluminum	1.6B+04	1.5B+01	
Arsenic	2.2B+02	2.0E-01	
Barium	1.6E+02	5.5B-01	
Cadmium	Not a CP	2.5B-02	ю́.
Chromium	4.9B+01	3.6B-02	
Cobalt	2.6B+01	Not a CPC	
Copper	2.0B+02	3.7B-01	.e.
Lead	4.1B+02	9.7B-01	
Manganese	3.9E+03	4.3B-01	, i
Mercury	3.6B-01	2.4思-04	۰,
Nickel	4.3B+01	Not a CPC	
Selenium	7.7B+00	2.4E-03	
Vanadium	Not a CP	7.2B-02	
Zinc	4.7B+02	7.1B-01	***
4,4'-DDD	4.4B-01	Not a CPC	
4,4'-DDB	1.6B-01	Not a CPC	
4,4'-DDT	7.6B-02	Not a CPC	···
Aroclor-1260	3.0B-01	Not a CPC	
Dieldrin	4.6B-02	Not a CPC	
Benzo[k]Iuoranthene	3.0B+00	Not a CPC	
Bis(2-ethylhexyl)phthalate	Not a CP	2.4B-02	ю -
Fluoranthene	6.0B+00	Not a CPC	
Phenanthrene	3.0B+00	5.2B-04	
Pyrene	6.0B+00	Not a CPC	
1,2-Dichloroethylenes (cis and trans)	Not a CP	2.6E-02	
Acetone	3.1B-01	Not a CPC	
Methylene chloride	1.5B-01	4.1E-03	
Tetrachlorœthylene	7.8B-02	1.8E-03	
Toluene	2.0B-02	1.1B-03	
Trichlorofluoromethane	7.6B-02	Not a CPC	

BSTIMATED TISSUE LEVELS IN PRIMARY PREY ITEMS

		Aq. Org.		Raccoon	
Aquatic	Aquatic	Tissue ,	Aquatic	Tissue	Tissue
Organism	Organism	Level	Plant	Bxposure	Bxposure
BCF [a]	BAF [a]	(mg/kg)	BAF[a]	(mg/kg)	(mg/kg)
<300	7.5E-02	1.2E+03	6.0E-03	1.2B+03	1.2E+03
<300	6.6B-03	1.5B+00	3.0E-01	1.5B+00	1.5E+00
< 300	7.5B-03	1.2B+00	2.5B-02	1.2B+00	1.2B+00
3.2B+02	NA	7.8E+00	NA	7.8E+00	7.8E+00
<300	1.6B-01	7.8E+00	6.3B-03	7.8E+00	7.8B+00
NA	1.0B+00	2.6B+01	9.3B-03	2.6B+01	2.6B+01
3.4B+02	1.6B-01	1.3B+02	6.0B-02	1.3B+02	1.3B+02
<300	7.8E-02	3.2E+01	5.6B-02	3.2B+01	3.2E+01
1.7B + 03	2.0B-02	7.2B+02	1.3B-01	7.2B+02	7.2B+02
6.3B+04	1.7B+01	1.5B+01	2.4B-01	1.5B+01	1.5E+01
NA	2.3B-01	9.9B+00	1.4B-02	9.9B+00	9.9B+00
< 300	7.6B-01	5.9E+00	1.6B-01	5.9B+00	5.9E+00
< 300	NA	0.0E+00	NA	0.0B+00	0.0E+00
<300	1.8B+00	8.4E+02	9.2B-01	8.4B+02	8.4日+02
NA	NA	NA	1.0B-02	0.0B+00 [b]	5.5B-02 [b]
NA	NA	NA	1.0B-02	4.1E-03 [b]	5.3B-02 [b]
NA	2.1B + 00	1.6B-01	1.0B-02	1.6B-01	1.6B-01
NA	NA	NA	1.2B-01	7.3B-02 [b]	1.5B-01 [b]
NA	NA	NA	1.7B-02	0.0E+00 [b]	2.2B-03 [b]
NA	5.0B-02	1.5B-01	4.9B-02	1.5B-01	1.5B-01
3.1E+02	5.0B-02	7.4E+00	7.6B-03	7.4E+00	7.4E+00
NA	5.0B-02	3.0B-01	4.9B-02	3.0B-01	3.0B-01
3.2B+02	5.0B-02	1.7E-01	4.9B-02	1.7E-01	1.7B-01
NA	5.0B-02	3.0B-01	4.9B-02	3.0B-01	3.0E-01
NA	NA	NA	NA	NA	NA
NA	NA	NA	NA	NA	NA
NA	NA	NA	NA	NA	NA
NA	NA	NA	NA	NA	NA
NA	NA	NA	NA	NA	NA
NA	NA	NA	NA	NA	NA

Table O-2.7

Estimated Chronic Exposure to Semi - Aquatic Receptors from Ingestion of RME Exposure Concentrations of CPCs in Food, Unfiltered Surface Water, and Sediment Area 2

Remedial Investigation Report, AOC 57 Devens, Massachusetts

EXPOSURE CONCENTRATION DATA

	Aquatic	Organism	BCF[a]	NA	NA	NA	NA	NA	NA	NA	NA	A'N	V	Y Y	
RME UNFILT	SURFACE WATER	CONCENTRATION	(mg/L)	Not a CPC	Not a CPC	Not a CPC	Not a CPC	Not a CPC	Not a CPC	1.1B-03	Not a CPC	7.2E-04	3.5B-03	Not a CPC	
RME	SEDIMBNT	CONCENTRATION	(mg/kg)	Not a CP	Not a CP	Not a CP	1.2B+00	Not a CP	Not a CP	Not a CP	Not a CP	Not a CP	2.7B-02	Not a CP	
		CHEMICAL		1,2-Dichlorobenzene	1,4-Dichlorobenzene	Benzo(b)fluoranthene	Chrysene	Naphthalene	Benzene	Carbon disulfide	Chlorobenzene	Chloroform	Trichlorœthylene	Xylene	

0.0E+00

0.0E+00 0.0E+00 0.0E+00

0.0B+00 0.0B+00 6.0B-02 0.0B+00

0.0B+00 6.0B-02 0.0E+00

0.0B+00 2.5B-02

5.0B-02 5.0B-02 0.0E+00 0.0E+00 0.0E+00 0.0E+00

Brposure (mg/kg)

Brposure

Plant

Level

Organism. BAF[a]

Aquatic

Tissue Aquatic

Aq. Org.

(mg/kg)

(mg/kg) BAF[a]

0.0B+00 7.3B-02 0.0B+00 7.3B-02 0.0B+00 2.5B-02 6.0B-02 2.5B-02

5.0E-02 5.0E-02 5.0B-02

Raccoon

ESTIMATED TISSUE LEVELS IN PRIMARY PREY ITEMS

Appendix O. Tables O-1.2 and O-1.3 BAFs are multiplied by sediment concentrations and BCFs are multiplied by the

surface water concentrations; BCFs <300 were not used as per USBPA (1989). The aquatic organism tissue level is equal to the greater of the two products.

[b] Measured crayfish and fish tissue concentrations (provided in Table O-1.3).

[a] Bioaccumulation data presented in:

A2SWSDUM.wk1

Table O-Z.7 Estimated Chronic Exposure to Semi-Aquatic Receptors from Ingestion of RME Exposure Concentrations of CPCs in Food, Unfiltered Surface Water, and Sediment Area 2

Remedial Investigation Report, AOC 57 Devens, Massachusetts

POTENTIAL DIETARY EXPOSURE (mg/kgBW-day) [c]

CHEMICAL	Muskrat Mallard		Raccoon	Great blue heron
Aluminum	1.2B+02	7.2B-02	2.5B-01	6.3E+01
Arsenic	5.0B+00	1.1B-02	2.1B-03	2.5B-01
Barium	1.3B+00	1.3B-03	1.6B-03	1.9E-01
Cadmium	5.4B-02	1.7B-05	7.0B-04	3.2E-01
Chromium	3.9B-01	2.3B-04	1.1B-03	3.6E-01
Cobalt	3.5B-01	1.7B-04	2.5B-03	1.1B+00
Copper	2.8B+00	2.9B-03	1.3E-02	5.4B+00
Lead	4.2B+00	5.3B-03	6.6E-03	1.7B+00
Manganese	5.8E+01	9.7B-02	9.9B-02	3.3B+01
Mercury	1.1B-01	4.0B-05	1.4压-03	6.3E-01
Nickel	3.8E-01	2.5B-04	1.3B-03	4.4B-01
Selenium .	1.6B-01	2.3B-04	5.9压-04	2.5B-01
Vanadium	6.8B-03	1.2B-05	1.1B-05	7.6B-04
Zinc	3.2B+01	7.2B-02	7.9B-02	3.5B+01
4,4'-DDD	3.1B-03	2.2B-06	3.9E-06	2.6B-03
4,4'~DDE	1.2E-03	8.0B-07	1.850-06	2.3B-03
4,4'-DDT	1.6E-03	6.4B-07	1.5B-05	6.6E-03
Aroclor-1260	3.9B-03	6.8B-06	9.1B-06	6.6E-03
Dieldrin	3.5B-04	2.8B-07	4.0B-07	1.3B-04
Benzo[k]fluoranthene	2.9B-02	3.4B-05	4.0B-05	8.7E-03
Bis(2-ethylhexyl)phthalate	5.1B-02	1.6B-05	6.6B-04	3.1B-01
Fluoranthene	5.7B-02	6.8E-05	7.9E-05	1.7B-02
Phenanthrene	2.9B-02	3.4B-05	4.1E-05	9.5B-03
Pyrene	5.7B-02	6.8B-05	7.9B-05	1.7B-02
1,2-Dichloroethylenes (cis and trans)	2.5B-03	4.4B-06	4.1E-06	2.7B-04
Acetone	2.1B-03	1.0B-06	2.7B-06	2.6B-04
Methylene chloride	1.4E-03	1.2E-06	2.0B-06	1.7B-04
Tetrachloroethylene	6.9B-04	5.6E-07	9.7B07	8.4B-05
Toluene	2.4B-04	2.5B-07	3.5B-07	2.8B-05
Trichlorofluoromethane	5.0B-04	2.5B-07	6.7B-07	6.4B-05

Table O-2.7 Estimated Chronic Exposure to Semi-Aquatic Receptors from Ingestion of RME Exposure Concentrations of CPCs in Food, Unfiltered Surface Water, and Sediment Area 2

Remedial Investigation Report, AOC 57 Devens, Massachusetts

POTENTIAL DIETARY EXPOSURE (mg/kgbw-day) [c]

Naccoon 0.0B+00 0.0B+00 0.0B+00 1.6B-05 0.0B+00 0.0B+00 1.7B-07 1.1B-07 1.9B-07					
0.0E+00 0.0B+00 0.0B+00 0.0E+00 0.0B+00 0.0B+00 0.0B+00 0.0B+00 0.0B+00 9.9E-03 4.1E-06 1.6B-05 0.0B+00 0.0B+00 0.0B+00 0.0B+00 0.0B+00 0.0B+00 1.0B-04 1.8B-07 1.7B-07 0.0B+00 0.0B+00 0.0B+00 5.1B-04 5.1B-07 1.1B-07 0.0B+00 0.0B+00 0.0B+00				Нассооп	Great blue heron
0.0B+00 0.0B+0	1,2-Dichlorobenzene	0.0E+00	0.0B+00	0.0E+00	0.0B+00
0.0B+00 0.0B+0	1,4-Dichlorobenzene	0.0E+00	0.0B+00	0.0E+00	0.08+00
9.9B-03 0.0B+00	Benzo(b)fluoranthene	0.0E+00	0.05年00	0.0B+00	0.0B+00
0.0B+00 0.0B+00 0.0B+00 0.0B+00 0.0B+00 0.0B+00 1.0B-04 1.8B-07 1.7B-07 0.0B+00 0.0B+00 0.0B+00 6.8B-05 1.2B-07 1.1B-07 5.1B-04 6.8B-07 7.9B-07 0.0B+00 0.0B+00 0.0B+00	Chrysene	9.9B-03	4.1E-06	1.6E-05	3.5B-03
0.0B+00 0.0B+00 0.0B+00 1.0B-04 1.8B-07 1.7B-07 0.0B+00 0.0B+00 0.0B+00 6.8B-05 1.2B-07 1.1B-07 5.1B-04 6.8B-07 7.9B-07 0.0B+00 0.0B+00 0.0B+00	Naphthalene •	0.0E+00	0.0B+00	0.013+00	0.0E+00
1.0B-04 1.8B-07 1.7B-07 0.0B+00 0.0B+00 0.0B+00 6.8B-05 1.2B-07 1.1B-07 5.1B-04 6.8B-07 7.9B-07 0.0B+00 0.0B+00 0.0B+00	Benzene	0.0E+00	0.0B+00	0.0E+00	0.0B+00
6.8B-05 0.0B+00 0.0B+00 0.0B+00 0.0B+00 0.0B+00 0.0B+00 0.0B+00 0.0B+00 0.0B+00 0.0B+00	Carbon disuffide	1.0E-04	1.8B-07	1.7B-07	1.2E-05
octhylene 6.8B-05 1.2B-07 1.1B-07 6.8B-07 1.9B-07 6.0B+00 0.0B+00 0.0B+00	Chlorobenzene	0.0B+00	0.013+00	0.0E+00	0.0B+00
oethylene 5.1B-04 6.8B-07 7.9B-07 0.0B+00 0.0B+00 0.0B+00 0.0B+00	Chloroform	6.8B-05	1.2B-07	1.1E-07	7.6B-06
0.0B+00 00+B0.0	Trichloroethylene	5.1B-04	6.8E-07	7.9E-07	6.0B-05
	W.done	0.013+00	0.03+00	0.0E+00	0.0E+00

[[]c] Calculated by summing the products of individual prey type concentrations and percent in diet with surface water and sediment exposures, multiplying by the exposure duration, SFF and ingestion rate, and dividing by body weight (Table 9-27).

Table O - E./
Exposure Parameters and Assumptions for Semi - Aquatic Receptors Area 2

Remedial Investigation Report, AOC 57 Devens, Massachusetts

EXPOSURE PARAMETERS [d]

Body Weight (kg)	1.27	1.134	3.99	2.23
Water Ingestion Rate (L/day)	0.12	0.064	0.344	0.101
Dietary Ingestion Rate (kg/day)	0.084	0.063	0.214	0,401
Site Foraging Frequency [f]	1.00E+00	2.98E-03	1.82E-03	4.67E-01
	-	1	щ	0.5
ED [c]				0
ome Range (acres)	0.2	235	385	1.5
Home Range Sediment (nores)	10%	7%	%6	2%
Plants	80%	91%	%0	0%
ent Prey in Diet Aquatic Organisms	10%	1%	91%	98%
Percent Prey in Die Aquatic Organisms	(Small herb. mammal)	(Small herb. bird)	(Predatory mammal)	(Piscivorous bird)
Indicaça Species	Muskrat	Mallard	Raccoon	Great blue heron

NOTES:

[d] Documentation of exposure parameters presented in:

Appendix O, Table O-1.1

[e] BD = Exposure Duration (percentage of year receptor is expected to be found at study area)

[f] SFF = Site Foraging Frequency (calculated by dividing site area by receptor home range (cannot exceed 1.0))

SITE ARBA: 0.7 acres

A2SWSDUM.wk1

Table O-z.s
Estimated Chronic Exposure to Semi-Aquatic Receptors from Ingestion of Average Exposure Concentrations of CPCs in Food, Unfiltered Surface Water, and Sediment Area 2

Remedial Investigation Report, AOC 57 Devens, Massachusetts

EXPOSURE CONCENTRATION DATA

	AVERAGE	AVBRAGE UNFILT.	
	SEDIMENT	SURFACE WATER	< .
CHEMICAL	CONCENTRATION	CONCENTRATION	ō
	(mg/kg)	(mg/L)	æ
Aluminum	1.2B+04	2.6E+00	
Arsenic	7.0B+01	5.1B-02	
Barium	7.0E+01	1.6B-01	
Cadmium	Not a CP	5.8B-03	
Chromium	2.3B+01	8.5B-03	
Cobalt	1.5B+01	Not a CPC	
Copper	4.7B+01	7.5B-02	
Lead	1.7E+02	2.4E-01	
Manganese	1.2B+03	2.4B-01	
Mercury	8.1B-02	1.4B-04	
Nickel	2.9B+01	Not a CPC	
Selenium	2.3B+00	1.5B-03	
Vanadium	Not a CP	1.7B-02	
Zinc	2.1E+02	1.8B-01	
4,4°-DDD	1.5B-01	Not a CPC	
4,4'-DDE	5.6B-02	Not a CPC	
4,4°-DDT	4.0B-02	Not a CPC	
Aroclor-1260	6.9B-02	Not a CPC	
Dieldrin	9.6E-03	Not a CPC	
Benzo[k]fluoranthene	5.8B-01	Not a CPC	
Bis(2-ethylhexyl)phthalate	Not a CP	4.8B-03	<u>г</u>
Fluoranthene	2.2压+00	Not a CPC	
Phenanthrene	8.0B-01	2.8B-04	···
Pyrene	2.3B+00	Not a CPC	
1,2-Dichloroethylenes (cis and trans)	Not a CP	3.1E-03	
Acetone	8.0B-02	Not a CPC	
Methylene chloride	2.2B-02	1.8B-03	
Tetrachloroethylene	1.0B-02	1.1B-03	
Toluene	5.0E-03	3.4B-04	
Trichlorofluoromethane	1.3E-02	Not a CPC	

ESTIMATED TISSUE LEVELS IN PRIMARY PREY ITEMS

																		[b]	[b]		[6]	[6]											
Heron	Tissue	Brposure	(mg/kg)	8.7B+02	4.6B-01	5.2B-01	1.8E+00	3.7E+00	1.5E+01	2.5E+01	1.4E+01	4.0E+02	8.9E+00	6.7B+00	1.7E+00	0.0B+00	3.7B+02	5.5B-02	5.3B-02	8.4E-02	1.5B-01	2.2B-03	2.9B-02	1.5B+00	1.1E-01	9.1B-02	1.1B-01	NA	NA	NA	NA	NA	NA
Raccoon	Tissue	Exposure	(mg/kg)	8.7B+02	4.6E-01	5.2B-01	1.8E+00	3.7E+00	1.5B+01	2.5B+01	1.4B+01	4.0E+02	8.9B+00	6.7B+00	1.7B+00	0.0B+00	3.7B+02	0.0B+00 [b]	4.1E-03 [b]	8.4B-02	7.3B-02 [b]	0.0E+00 [b]	2.9B-02	1.5B+00	1.1B-01	9.1B-02	1.1B-01	ΝΑ	NA	NA	NA	NA	NA
	Aquatic	Plant	BAF[a]	6.0E-03	3.0E-01	2.5B-02	NA	6.3E-03	9.3E-03	6.0B-02	5.6B-02	1.3B-01	2.4B-01	1.4B-02	1.6B-01	NA	9.2B-01	1.0B-02	1.0B-02	1.0B-02	1.2B-01	1.7B-02	4.9B-02	7.6B-03	4.9B-02	4.9B-02	4.9B-02	NA	NA	NA	NA	NA	NA
Aq. Org.	Тіѕѕие	Level	(mg/kg)	8.7E+02	4.6B-01	5.2B-01	1.8E+00	3.7B+00	1.5E+01	2.5B+01	1.4B+01	4.0E+02	8.9E+00	6.7B+00	1.7B+00	0.0E+00	3.7B+02	NA	NA	8.4B-02	NA	NA	2.9B-02	1.5E+00	1.1B-01	9.1B-02	1.1B-01	NA	NA	NA	NA	NA	NA
	Aquatic	Organism	BAF[a]	7.5B-02	6.6B-03	7.5B-03	NA	1.6B-01	1.0E+00	1.6E-01	7.8E - 02	2.0E-02	1.7B+01	2.3B-01	7.6B-01	NA	1.8B+00	NA	NA	2.1B + 00	NA	NA	5.0E-02	5.0B-02	5.0E-02	5.0E-02	5.0E-02	NA	NA	NA	NA	NA	NA
	Aquatic	Organism	BCF[a]	<300	<300	<300	3.2E+02	< 300	NA	3.4E+02	< 300	1.7B+03	6.3E+04	NA	<300	<300	< 300	NA	NA	NA	NA	NA	NA	3.1B+02	NA	3.2E+02	NA	NA	NA	NA	NA	NA	NA

Table O-2.8

Estimated Chronic Exposure to Semi-Aquatic Receptors from Ingestion of Average Exposure Concentrations of CPCs in Food, Unfiltered Surface Water, and Sediment Area 2

Remedial Investigation Report, AOC 57 Devens, Massachusetts

EXPOSURE CONCENTRATION DATA

EXPOSURE CONCENTRATIO	FRATION DATA		BSTIMATE	TISSUE 1	CEVELS IN	PRIMA	BSTIMATED TISSUE LEVELS IN PRIMARY PREY ITEMS	EMS
	AVERAGE	AVERAGE UNFILT.			Aq. Org.		Raccoon	Her
	SEDIMENT	SURFACE WATER	Aquatic	Aquatic	Tissue Aquatic	uatic	Tissue	Tiss
CHEMICAL	CONCENTRATION	CONCENTRATION	Organism	Organism	Level P	Plant	Exposure	Expos
	(mg/kg)	(mg/L)	BCF[a]	BAF[a]	BAF[a] (mg/kg) BAF[a]	AF [a]	(mg/kg)	(mg/l
1,2-Dichlorobenzene	Not a CP	Not a CPC	NA	5.0E-02	0.0E+00 7.3E-02	B-02	0.0E+00	0.0E
1,4-Dichlorobenzene	Not a CP	Not a CPC	NA	5.0E-02	0.0E+00 7.3E-02	B-02	0.0E+00	0.0E
Benzo(b)fluoranthene	Not a CP	Not a CPC	NA	5.0B-02	0.0E+00 2.5E-02	E-02	0.0E+00	0.0E
Chrysene	4.7B-01	Not a CPC	NA	5.0B-02	2.4E-02 2.5E-02	B-02	2.4B-02	2.4B
Naphthalene	Not a CP	Not a CPC	NA	5.0B-02	0.0B+00 2.5B-02	B-02	0.0E+00	0.0B
Benzene	Not a CP	Not a CPC	NA	NA	0.0E+00	ΝĄ	NA	
Carbon disulfide	Not a CP	3.4B-04	NA	NA	0.0E+00	NA	NA	
Chlorobenzene	Not a CP	Not a CPC	NA	NA	0.0B+00	NA	NA	
Chloroform	Not a CP	3.0E-04	A'N	NA	0.0E+00	NA	A'N	
Trichloroethylene	4.2B-03	6.5B-04	NA	NA	0.0B+00	NA	NA	
Xylene	Not a CP	Not a CPC	NA	NA	0.0B+00	N A	NA	

(mg/kg)

Exposure

Tissue

0.0E+00

0.0E+00 0.0E+00 2.4B-02

0.0B+00

BAPs are multiplied by sediment concentrations and BCFs are multiplied by the Appendix O, Tables O-1.2 and O-1.3

surface water concentrations; BCFs <300 were not used as per USBPA (1989). The aquatic organism tissue level is equal to the greater of the two products. [b] Measured crayfish and fish tissue concentrations (provided in Table O-1.3).

[a] Bioaccumulation data presented in:

A2SWSDUA.wk1

Table 0-2.8
Estimated Chronic Exposure to Semi-Aquatic Receptors from Ingestion of Average Exposure Concentrations of CPCs in Food, Unfiltered Surface Water, and Sediment Area 2

Remedial Investigation Report, AOC 57 Devens, Massachusetts

POTENTIAL DIETARY EXPOSURE (mg/kgBW-day) [c]

				一个一个一个一个一个一个一个一个一个一个一个一个一个一个一个一个一个一个一个
CHEMICAL Musici	re Mallard		Raccoon	Great blue heron
Aluminum	8.6E+01	5.1E-02	1.8B-01	4,6B+01
Arsenic	1.6E+00	3.6B-03	6.7B-04	7.9B-02
Barium	5.7B-01	5.4B-04	6.8B-04	8.2B-02
Cadmium	1.3B-02	4.0E-06	1.6B-04	7.6B-02
Chromium	1.9B-01	1.1E-04	5.3B-04	1.7B-01
Cobalt	2.1E-01	9.7E-05	1.5B-03	6.3E-01
Copper	6.3B-01	6.6B-04	2.7B-03	1.1E+00
Lead	1.8B+00	2.2E-03	2.8E-03	7.1B-01
Manganese	1.9B+01	3.0B-02	4.6E-02	1.8B+01
Mercury	6.1B-02	1.8B-05	7.9B-04	3.7B-01
Nickel	2.6B-01	1.7E-04	8.5B-04	3.0B~01
Selenium	4.6B-02	7.0E-05	1.8B-04	7.4B-02
Vanadium	1.6E-03	2.8E-06	2.6E-06	1.8B-04
Zinc	1.4B+01	3.2B-02	3.5B-02	1.5B+01
4,4'-DDD	1.1B-03	7.2B-07	1.3B-06	2.4B-03
4,4'-DDB	4.0B-04	2.8E-07	8.6B-07	2.2B-03
4,4'-DDT	8.4B-04	3.3E-07	7.8B-06	3.5B-03
Aroclor-1260	9.0E-04	1.6B-06	7.1B-06	6.4E-03
Dieldrin	7.2B-05	5.8B-08	8.4B-08	9.7B-05
Benzo[k]fluoranthene	5.5B-03	6.6B-06	7.7E-06	1.7B-03
Bis(2-ethylhexyl)phthalate	1.0B-02	3.3E-06	1.3B-04	6.1B-02
Fluoranthene	2.1B-02	2.5E-05	2.9B-05	6,3B-03
Phenanthrene	8.0E-03	9.2B→06	1.5E-05	4.4B-03
Pyrene	2.2B-02	2.6B-05	3.0E-05	6.6B-03
1,2-Dichloroethylenes (cis and trans)	2.9B-04	5.2E-07	4.9E-07	3.3E-05
Acetone	5.3B-04	2.7B-07	7.1B-07	6.7B-05
Methylene chloride	3.1B-04	3.7E-07	4.7B-07	3.7E-05
Tetrachloroethylene	1.7B-04	2.2E-07	2.6压-07	2.0B-05
Toluene	6.6B-05	7.4E-08	9.8B-08	7.8E-06
Trichlorofluoromethane	8.6E-05	4.3E08	1.1B-07	1.1B-05

Table 0-2.8 Estimated Chronic Exposure to Semi-Aquatic Receptors from Ingestion of Average Exposure Concentrations of CPCs in Food, Unfiltered Surface Water, and Sediment

Remedial Investigation Report, AOC 57 Devens, Massachusetts

POTENTIAL DISTARY EXPOSURE (mg/kgBW-day) [c]

CHEMICAL Musical	Mallard		Яассооп	Great blue heron
1,2-Dichlorobenzeng	0.0B+00	0.0B+00	0.0B+00	0.08+00
1,4-Dichlorobenzene	0.0B+00	0.0B+00	0.0B+00	0.0B+00
Benzo(b)fluoranthene	0.0E+00	0.0E+00	0.0E+00	0.01200
Chrysene	3.9B-03	1.6E-06	6.2B-06	1.4B-03
Naphthalene	0.0B+00	0.0E+00	0.0E+00	0.0E+00
Benzene	0.0E+00	0.0B+00	0.0E+00	0.0E+00
Carbon disulfide	3.3E-05	5.8B-08	5.4E-08	3.6B-06
Chlorobenzene	0.0B+00	0.0B+00	0.0E+00	0.0E+00
Chloroform	2.9E-05	5.1B-08	4.7E-08	3.2B-06
Trichloroethylene	8.9B-05	1.2B-07	1.4B-07	1.0B-05
Xylene	0.0B+00	0.0B+00	0.0B+00	0.0B+00

[6] Calculated by summing the products of individual prey type concentrations and percent in diet with surface water and sediment exposures, multiplying by the exposure duration, SFF and ingestion rate, and dividing by body weight (Table 9-27).

Table O-Z.8
Exposure Parameters and Assumptions for Semi-Aquatic Receptors Area 2

Remedial Investigation Report, AOC 57 Devens, Massachusetts

EXPOSURE PARAMETERS [d]

Indicator Species	Petro	nt Prey in Diet Aquatic	Plants	Home Ran Sediment (acres)	Home Range (acres)	[a] ag	Site Foraging Frequency [1]	Dietary Ingestion In Rate	Water Ingestion ' Rate	Body Weight (kg)
Muskrat	O (Small herb. mammal)	Organisms 10%	80%	10%	0.2	1	1.00B+00	3000E	L/day) 0.12	1.27
Mallard	(Herb. bird)	1%	%16	2%	235	1	2.98B-03	0.063	0.064	1.134
Raccoon	(Predatory mammal)	91%	% 0	%6	385	-	1.82B-03	0.214	0.344	3.99
Great blue heron	(Piscivorous bird)	%86	%0	2%	1.5	0.5	4.67B-01	0.401	0.101	2.23

NOTES:

Appendix O, Table O-1.1 [d] Documentation of exposure parameters presented in:

[e] BD = Bxposure Duration (percentage of year receptor is expected to be found at study area) [f] SFR = Site Foraging Frequency (calculated by dividing site area by receptor home range (cannot exceed 1.0))

0.7 acres SITE AREA: Table O-7.9
Estimated Chronic Exposure to Semi-Aquatic Receptors from Ingestion of RME Exposure Concentrations of CPCs in Food, Filtered Surface Water, and Sediment Area 2

Remedial Investigation Report, AOC 57 Devens, Massachusetts

	RME	RMEFILTERED	
•	SEDIMENT	SURFACE WATER	Aquatic
CHEMICAL	CONCENTRATION	CONCENTRATION	Organism
	(mg/kg)	(mg/L,)	BCF[a]
Aluminum	1.6E+04	Not a CPC	NA
Arsenic	2.2E+02	8.9E-03	<300
Barium	1.6E+02	4.3E-02	<300
Cadmium	Not a CP	Not a CPC	V N
Chromium	4.9E+01	Not a CPC	-V
Cobalt	2.6E+01	Not a CPC	NA NA
Copper	2.0E+02	Not a CPC	AN .
Lead	4.1E+02	2.3E-03	<300
Manganese	3.9E+03	4.8E-01	1.7E+03
Mercury	3.6E-01	Nota CPC	AN
Nickel	4.3E+01	Not a CPC	AN
Selenium	7.7E+00	Not a CPC	AN AN
Vanadium	Not a CP	Not a CPC	AN AN
Zinc	4.7E+02	5.8E-02	× × 300
4,4'-DDD	4.4臣—01	Not a CPC	NA WA
4,4'-DDE	1.6E-01	Not a CPC	NA
4,4'-DDT	7.6E-02	Not a CPC	NA
Aroclor-1260	3.0压-01	Not a CPC	NA NA
Dieldrin	4.6E-02	Nota CPC	Y Y
Berzo[k]fluoranthene	3.0E+00	Nota CPC	NA NA
Bis(2-ethylhexyl)phthalate	Not a CP	2.4E-02	3.1E+02
Fluoranthene	6.0E+00	Nota CPC	NA
Phenanthrene	3.0E+00	5.2E-04	3.2E+02
Pyrene	6.0E+00	Not a CPC	NA
1,2-Dichloroethylenes (cis an	Not a CP	2.6E-02	N.
Acetone	3.1E-01	Not a CPC	AN
Methylene chloride	1.5E-01	4.1E-03	NA
Tetrachloroethylene	7.8E-02	1.8E-03	NA
Toluene	2.0E-02	1.1E-03	NA
Trichlorofluoromethane	7.6E-02	Not a CPC	NA NA

		Aq, Org,		Кассооп	Heron
Aquatic	Aquatic	Tissue Ao	Aquatic	Tissue	Tissue
Organism	Organism	Level	Plant	Exposure	Exposure
BCF[a]	BAF[a]	(mg/kg) B	BAF[a]	(mg/kg)	(mg/kg)
NA	7.5E-02	1.2E+03 6.	6.0E-03	1.2E+03	1.2E+03
<300	6.6E-03	1.5E+00 3.	3.0E-01	1.5E+00	1.5E+00
<300	7.5E-03	1.2E+00 2.	2.5E-02	1.2E+00	1.2E+00
NA	NA	0.0E+00	NA A	0.0E+00	0.0E+00
NA	1.6E-01	7.8E+00 6.	6.3E-03	7.8E+00	7.8E+00
NA	1.0E+00	2.6E+01 9.	9.3E-03	2.6E+01	2.6E+01
NA	1.6E-01	3.2E+01 6.	6.0E-02	3.2E+01	3.2E+01
<300	7.8E-02	3.2E+01 5.	5.6E-02	3.2E+01	3.2E+01
1.7E+03	2.0E-02	8.0E+02 1.	1.3E-01	8.0E+02	8.0E+02
NA	1.7E+01	6.1E+00 2.	2.4E-01	6.1E+00	6.1E+00
NA	2.3E-01	9.9E+00 1.	1.4E-02	9.9E+00	9.9E+00
NA	7.6E-01	5.9E+00 1.	1.6E-01	5.9E+00	5.9E+00
NA	NA	0.0E+00	N A	0.0E+00	0.0E+00
<300	1.8E+00	8.4E+02 9.	9.2E-01	8.4E+02	8.4E+02
NA	NA	NA 1.	NA 1.0E-02	0.0E+00 [b]	5.5E-02 [b]
NA	NA	NA 1	1.0E-02	4.1E-03 [b]	5.3E-02 [b]
NA	2.1E+00	1.6E-01 1.	1.0E-02	1.6E-01	1.6B-01
NA	NA	NA 1	NA 1.2E-01	7.3E-02 [b]	1.5压-01 [b]
NA	NA	NA 1.	1.7E-02	0.0E+00 [b]	2.2E-03 [b]
NA	5.0E-02	1.5E-01 4.	4.9E-02	1.5E-01	1.5E-01
3.1E+02	5.0E-02	7.4E+00 7.	7.6E-03	7.4E+00	7.4E+00
NA	5.0E-02	3.0E-01 4.	4.9E-02	3.0E-01	3.0E-01
3.2E+02	5.0E-02	1.7E-01 4.	4.9E-02	1.7E-01	1.7E-01
NA	5.0E-02	3.0E-01 4.	4.9E-02	3.0E-01	3.0E-01
NA	ΝΑ	NA	NA	NA	NA
NA	NA	NA	NA	NA	NA
NA	NA	NA	NA	NA	NA
NA	NA	NA	ΑĀ	NA	NA
NA	Ą	NA	NA	NA	NA
AN NA	NA NA	NA	NA	NA	NA

Estimated Chronic Exposure to Semi-Aquatic Receptors from Ingestion of RME Exposure Concentrations of CPCs in Food, Filtered Surface Water, and Sediment Table 0-2.9 Area 2

Remedial Investigation Report, AOC 57 Devens, Massachusetts

EXPOSURE CONCENTRATION DATA

EXPOSURE CONCENTRATION DATA	RATION DATA		ESTIMATE	TISSUE I	EVELS IN I	RIMA	ESTIMATED TISSUE LEVELS IN PRIMARY PREY ITEMS	EMS
	RME	RMEFILTERED			Aq. Org.		Raccoon	Her
	SEDIMENT	SURFACE WATER	Aquatic	Aquatic	Tissue Aquatic	ıatic	Tissue	Tissi
CHEMICAL	CONCENTRATION	CONCENTRATION	2000	Organism	Level P	Plant	Exposure	Expos
	(mg/kg)	(mg/L)	BCF [a]	BAF [a]	(mg/kg) BAF [a]	Æ[a]	(mg/kg)	(mg/
1,2-Dichloroberzene	Not a CP	Not a CPC	NA	5.0E-02	0.0E+00 7.3E-02	E-02	0.0E+00	0.0E
1,4-Dichloroberzene	Not a CP	Not a CPC	NA	5.0E-02	0.0E+00 7.3E-02	E-02	0.0E+00	0.0E
Berzo(b)fluoranthene	Not a CP	Not a CPC	NA	5.0E-02	0.0E+00 2.5E-02	B-02	0.0E+00	0.0E
Chrysene	1.2E+00	Not a CPC	NA	5.0E-02	6.0E-02 2.5E-02	E-02	6.0E-02	6.0E
Naphthalene	Not a CP	Not a CPC	NA	5.0E-02	0.0E+00 2.5E-02	E-02	0.0E+00	0.0E
Berzene	Not a CP	Not a CPC	NA	NA	0.0E+00	NA	NA	
Carbon disulfide	Nota CP	1.1E-03	NA	NA AA	0.0E+00	NA	NA	
Chlorobenzene	Not a CP	Not a CPC	NA	NA	0.0E+00	NA	NA AA	
Chloroform	Not a CP	7.2E-04	NA	NA	0.0E+00	NA	NA	
Trichloroethylene	2.7E-02	3.5E-03	NA	AN N	0.0E+00	NA	NA	
Xylene	Not a CP	Not a CPC	NA	NA	0.0E+00	NA	NA	

X X X X X X X

0.0E+00 0.0E+00

Exposure

Tissue Heron

(mg/kg)

6.0E-02

0.0E+00

0.0E+00

BAFs are multiplied by sediment concentrations and BCFs are multiplied by the surface water concentrations; BCFs <300 were not used as per USEPA (1989). The aquatic organism tissue level is equal to the greater of the two products. Appendix O, Tables O-12 and O-1.3 [a] Bioaccumulation data presented in:

[b] Measured crayfish and fish tissue concentrations (provided in Table O-1.3).

Table O.9
Estimated Chronic Exposure to Semi – Aquatic Receptors from Ingestion of RME Exposure Concentrations of CPCs in Food, Filtered Surface Water, and Sediment Area 2

Remedial Investigation Report, AOC 57 Devens, Massachusetts

POTENTIAL DIETARY EXPOSURE (mg/kgBW-day) [c]

CHEMICAL Muskrat	at Mallard		Явссооп	Great blue heron
Aluminum .	1.2B+02	7.0B-02	2.5B-01	6.2B+01
Arsenic	5.0B+00	1.1B-02	2.1B-03	2.4B-01
Barium	1.3E+00	1.2B-03	1.5B-03	1.8B-01
Cadmium	0.0B+00	0.0B+00	0.0E+00	0.03+00
Chromium	3.9B-01	2.2B-04	1.1E-03	3.6B-01
Cobalt	3.5B-01	1.7B-04	2.5B-03	1.1B+00
Copper	2.2B+00	2.7B-03	4.6B-03	1.5B+00
Lead	4.1E+00	5.1B-03	6.4E-03	1.7B+00
Manganese	5.9B+01	9.7B-02	1.1B-01	3.6B+01
Mercury	4.7B-02	2.5B-05	5.5B-04	2.5B-01
Nickel	3.8E-01	2.5B-04	1.3B-03	4.4B-01
Selenium	1.5B-01	2.3B-04	5.9B-04	2.5B-01
Vanadium	0.0B+00	0.0B+00	0.0E+00	0.0B+00
Zinc	3.1B+01	7.2B-02	7.9B-02	3.5B+01
4,4'-DDD	3.1B-03	2.2E-06	3.9压-06	2.6E-03
4,4'-DDE	1.2E-03	8.0B-07	1.8B-06	2.3E-03
4,4'-DDT	1.6B-03	6.4B-07	1.5B-05	6.6E-03
Aroclor-1260	3.9B-03	6.8E-06	9.1B-06	· 6.6B-03
Dieldrin	3.5B-04	2.8B-07	4.0B-07	1.3E-04
Benzo[k]fluoranthene	2.9B-02	3.4B-05	4.0B-05	8.7E-03
Bis(2-ethylhexyl)phthalate	5.1B-02	1.6B-05	6.6B-04	3.1B-01
Fluoranthene	5.7B-02	6.8B-05	7.9B-05	1.7B-02
Phenanthrene	2.9B-02	3.4B-05	4.1B-05	9.5B-03
Pyrene ;	5.7B-02	6.8B-05	7.9B-05	1.7B-02
1,2-Dichloroethylenes (cis an	2.5B-03	4.4E-06	4.1B-06	2.7B-04
Acetone	2.1B-03	1.0E-06	2.7B-06	2.6B-04
Methylene chloride	1.4B-03	1.2B-06	2.0E-06	1.7B-04
Tetrachloroethylene	6.9B-04	5.6B-07	9.7B-07	8,4B-05
Toluene	2.4E-04	2.5B-07	3.5B-07	2.8B-05
Trichlorofluoromethane	5.0B-04	2.5B-07	6.7B-07	6.4B-05

Table 0-2.9 Estimated Chronic Exposure to Semi-Aquatic Receptors from Ingestion of RME Exposure Concentrations of CPCs in Food, Filtered Surface Water, and Sediment

Remedial Investigation Report, AOC 57 Devens, Massachusetts

POTENTIAL DIETARY BXPOSURE (mg/kgBW-day) [c]

CHBMICAL	Muskrat Mallard		Кассоол	Great blue heron
1,2-Dichlorobenzene	0.0B+00	0.0B+00	0.0B+00	0.0B+00
1,4-Dichlorobenzene	0.0B+00	0.0E+00	0.0B+00	0.0B+00
Benzo(b)fluoranthene	0.0E+00	0.0E+00	0.0B+00	0.0B+00
Chrysene	9.9B-03	4.1B-06	1.6B-05	3.5E-03
Naphthalene	0.0B+00	0.0B+00	0.0E+00	0.0E+00
Benzene	0.0B+00	0.0E+00	0.0E+00	0.0E+00
Carbon disulfide ,	1.0B-04	1.8B-07	1.7B-07	1.2B-05
Chlorobenzene	0.0B+00	0.0E+00	0.0E+00	0.0B+00
Chloroform	6.8B-05	1.2B-07	1.1B-07	7.6E-06
Trichloroethylene	5.1B-04	6.8E-07	7.9B-07	6.0B-05
Xylene	0.0B+00	0.0B+00	0.0E+00	0.0B+00
	20.000	20.5	0.05	0.02+00

[c] Calculated by summing the products of individual prey type concentrations and percent in diet with surface water and sediment exposures, multiplying by the exposure duration, SFF and ingestion rate, and dividing by body weight (Table 9-27).



Table O-Z.9
Exposure Parameters and Assumptions for Semi-Aquatic Receptors Area 2

Remedial Investigation Report, AOC 57 Devens, Massachusetts

EXPOSURE PARAMETERS [d]

8	Percent Prey in Diet Aquatic Organisms	Plants	Home Ran Sediment (acres)	9	HD [e]	Site Foraging Frequency [f]			Weight (Kg)
(Small herb. mammal)	10%	80%	10%	0.2	1	1.00B+00	0.084	0.12	1.27
(Herb. bird)	1%	91%	2%	235	1	2.98E-03	0.063	0.064	1.134
(Predatory mammal)	91%	% 0	%6	385	₩.	1.82E-03	0.214	0.344	3.99
(Piscivorous bird)	98%	%0	7%	1.5	0.5	4.67E-01	0.401	0.101	2.23

NOTES:

Appendix O, Table O-1.1

[d] Documentation of exposure parameters presented in: [e] BD = Bxposure Duration (percentage of year receptor is expected to be found at study area)

[f] SFR = Site Foraging Frequency (calculated by dividing site area by receptor home range (cannot exceed 1.0))

0.7 acres SITE AREA: Table O-Z.10
Estimated Chronic Exposure to Semi-Aquatic Receptors from Ingestion of Average Exposure Concentrations of CPCs in Food, Filtered Surface Water, and Sediment Area 2

Remedial Investigation Report, AOC 57 Devens, Massachusetts

EXPOSURE CONCENTRATION DATA

	AVERAGE	AVERAGE FILT.
	SEDIMENT	SURFACE WATER
CHEMICAL .	CONCENTRATION	CONCENTRATION
	(mg/kg)	(mg/L)
Aluminum	1.2B+04	Not a CPC
Arsenic	7.0B+01	4.4B-03
Barium	7.0B+01	2.2B-02
Cadmium	Not a CP	Not a CPC
Chromium	2.3B+01	Not a CPC
Cobalt	1.5B+01	Not a CPC
Copper	4.7B+01	Not a CPC
Lead	1.7B+02	5.8B-03
Manganese	1.2B+03	2.0B-01
Mercury	8.1B-02	Not a CPC
Nickel	2.9B+01	Not a CPC
Selenium	2.3E+00	Not a CPC
Vanadium	Not a CP	Not a CPC
Zinc 1	2.1B+02	2.2B-02
4,4'-DDD	1.5B-01	Not a CPC
4,4'-DDB'	5.6B-02	Not a CPC
4,4'-DDT	4.0E-02	Not a CPC
Aroclor-1260	6.9B-02	Not a CPC
Dieldrin	9.6E-03	Not a CPC
Benzo[k]fluoranthene	5.8B-01	Not a CPC
Bis(2-ethylhexyl)phthalate	Not a CP	4.8B-03
Fluoranthene	2.2B+00	Not a CPC
Phenanthrene	8.0E-01	2.8B-04
Pyrene	2.3B+00	Not a CPC
1,2-Dichloroethylenes (cis and trans)	Not a CP	3.1E-03
Acetone	8.0B-02	Not a CPC
Methylene chloride	2.2B-02	1.8E-03
Tetrachloroethylene	1.0B-02	1.1B-03
Toluene	5.0E-03	3.4B-04
Trichlorofluoromethane	1.3B-02	Not a CPC

BSTIMATED TISSUE LEVELS IN PRIMARY PREY ITEMS

		Aq. Org.		Raccoon	Heron
Aquatic	Aquatic	Tissue	Aquatic	Tissue	Tissue
Organism	Organism	Level	Plant	Exposure	Bxposure
BCF[a]	BAF[R]	(mg/kg)	BAF[8]	(mg/kg)	(mg/kg)
NA	7.5B-02	8.7B+02	6.0E-03	8.7B+02	8.7B+02
< 300	6.6B-03	4.6B-01	3.0E-01	4.6B-01	4.6B-01
< 300	7.5B-03	5.2B-01	2.5B-02	5.2B-01	5.2B-01
NA	NA	0.0B+00	NA	0.0E+00	0.0B+00
NA	1.6E-01	3.7E+00	6.3B-03	3.7B+00	3.7E+00
NA	1.0E+00	1.5E+01	9.3B-03	1.5B+01	1.5E+01
NA	1.6B-01	7.5B+00	6.0B-02	7.5B+00	7.5B+00
<300	7.8B-02	1.4B+01	5.6B-02	1.4B+01	1.4B+01
1.7E+03	2.0E-02	3.3B+02	1.3B-01	3.3E+02	3.3B+02
NA	1.7B+01	1.4E+00	2.4B-01	1.4B+00	1.4B+00
NA	2.3E-01	6.7E+00	1.4B-02	6.7B+00	6.7B+00
NA	7.6E-01	1.7B+00	1.6B-01	1.7B+00	1.7B+00
NA	NA	0.0B+00	NA	0.0E+00	0.0B+00
<300	1.8B+00	3.7B+02	9.2B-01	3.7E+02	3.7B+02
NA	NA	NA	1.0B-02	0.0E+00 [b]	5.5B-02
NA	NA	NA	1.0B-02	4.1B-03 [b]	5.3B-02
NA	2.1E+00	8.4B-02	1.0压-02	8.4B-02	8.4B-02
NA	NA	NA	1.2B-01	7.3B-02 [b]	1.5B-01 [b]
NA	NA	NA	1.7B-02	0.0B+00 [b]	2.2B-03
NA	5.0E-02	2.9B-02	4.9B-02	2.9B-02	2.9B-02
3.1E+02	5.0E-02	1.5B+00	7.6B-03	1.5B+00	1.5B+00
NA	5.0B-02	1.1B-01	4.9B-02	1.1B-01	1.1B-01
3.2B+02	5.0B-02	9.1E-02	4.9E-02	9.1B-02	9.1B-02
NA	5.0B-02	1.1B-01	4.9B-02	1.1B-01	1.1B-01
NA	NA	NA	NA	NA	NA
ΝĀ	NA	NA	NA	NA	NA
NA	NA	NA	NA	NA	NA
NA	NA	NA	NA	NA	NA
NA	NA	NA	NA	NA	NA
N.A.	ŇĀ	NA	NA	NA	NA

Table O-2.10

Estimated Chronic Exposure to Semi-Aquatic Receptors from Ingestion of Average Exposure Concentrations of CPCs in Food, Filtered Surface Water, and Sediment Area 2

Remedial Investigation Report, AOC 57 Devens, Massachusetts

	AVERAGE	AVERAGE FILT.
	SEDIMENT	SURFACE WATER
CHEMICAL	CONCENTRATION	CONCENTRATION
	(mg/kg)	(mg/L)
1,2-Dichlorobenzene	Not a CP	Not a CPC
1,4-Dichlorobenzene	Not a CP	Not a CPC
Benzo(b)fluoranthene	Not a CP	Not a CPC
Chrysene	4.7B-01	Not a CPC
Naphthalene	Not a CP	Not a CPC
Benzene	Not a CP	Not a CPC
Carbon disulfide	Not a CP	3.4B-04
Chlorobenzene	Not a CP	Not a CPC
Chloroform	Not a CP	3.0B-04
Trichlorœthylene	4.2B-03	6.5B-04
Xylene	Not a CP	Not a CPC

A Z Z Z

NA

A A A

4 4 4 4 4 4 2 2 2 2 2 2

ΝĀ

0.0B+00 0.0E+00 0.0E+00 0.0B+00 0.0E+00

Brposure

Bxposure (mg/kg)

Plant

Level

Organism BCF [a]

Aquatic

(mg/kg) BAF[a]

BAF [a] Organism

Tissue

Tissue

Tissue Aquatic

Aq. Org.

Raccoon

STIMATED TISSUE LEVELS IN PRIMARY PREY ITEMS

0.0B+00

0.0E+00 0.0B+00

(mg/kg)

0.0E+00

0.0E+00 2.4B-02 0.0B+00

0.0B+00 2.5B-02 2.4B-02 2.5B-02 0.0E+00 2.5E-02

> 5.0B-02 5.0B-02

A A A A A A A A

0.0B+00 7.3B-02 0.0E+00 7.3E-02

5.0E-02 5.0B-02 5.0B-02

0.0E+00 2.4B-02 0.0及+00

BARs are multiplied by sediment concentrations and BCFs are multiplied by the [a] Bioaccumulation data presented in:

Appendix O, Tables O-1.2 and O-1.3

BAFs are multiplied by sediment concentration suffered in:

Surface water concentrations; BCFs < 300 were not used as per USEPA (1989). The aquatic organism tissue level is equal to the greater of the two products. [a] Bioaccumulation data presented in:

[b] Measured crayfish and fish tissue concentrations (provided in Table O-1.3).

Table O-2.10
Estimated Chronic Exposure to Semi-Aquatic Receptors from Ingestion of Average Exposure Concentrations of CPCs in Food, Filtered Surface Water, and Sediment Area 2

Remedial Investigation Report, AOC 57 Devens, Massachusetts

POTENTIAL DISTARY EXPOSURE (mg/kgBW-day) [c]

CHENDLY CALC. Maintends Abstituted Absti	TOTAL THE PROPERTY OF THE PARTY	1-17			
tum 8.68+01 5.18-02 1.88-01 tum 5.68+01 5.18-02 1.88-01 tum 5.68-01 5.28-04 6.68-04 tum 0.03+00 0.03+00 0.01+00 tum 1.98-01 1.18-04 5.38-04 tum 1.98-01 1.18-04 5.38-04 tum 1.18-01 5.78-03 1.78-03 nese 1.18+01 2.28-03 2.78-04 tum 4.68-01 1.18-04 4.98-02 tum 4.68-01 1.18-04 4.98-02 tum 4.68-01 1.78-04 4.98-04 tum 4.68-02 1.88-04 1.88-04 tum 4.68-02 1.88-04 1.88-04 tum 4.68-03 1.18-04 1.18-04 tum 4.68-04 2.78-05 1.88-04 tum 4.68-02 1.88-04 1.88-04 tum 4.68-03 1.88-04 1.88-04 tum 4.68-03 1.88-04	•			Raccoon	Great blue heron
tum 8.6B+01 5.1B-02 1.8B-01 tum 1.6B+00 3.6B-03 6.6B-04 tum 0.5B-01 5.2B-04 6.6B-04 tum 0.5B+00 0.0B+00 0.0B+00 tum 1.1B-01 1.1B-04 5.3B-04 tum 1.1B-01 9.7B-05 1.5B-03 see 1.1B-01 9.7B-05 1.5B-03 see 1.1B+01 9.7B-04 1.1B-03 see 1.1B-01 9.7B-02 4.0B-02 m 2.6B-01 1.7B-04 8.5B-04 m 4.6B-02 1.7B-03 1.7B-04 m 4.6B-02 1.7B-04 8.5B-04 m 4.6B-02 1.7B-04 8.5B-04 m 4.6B-02 1.7B-04 8.5B-04 m 1.1B-03 1.1B-03 1.1B-03 m 4.6B-04 3.2B-04 1.1B-03 m 1.1B-03 1.2B-03 1.2B-04 m 1.1B-03 1.2B-03 1.2B-03					
1,68+00 3,68-03 6,68-04 nm 5,68-01 5,28-04 6,68-04 nm 0,08+00 0,08+00 6,08+00 tum 1,98-01 1,13-03 5,38-04 nm 1,18-01 1,18-03 1,28-03 nese 1,18-01 2,28-03 1,18-03 nese 1,18-02 2,18-03 1,18-03 nese 1,18-03 1,18-03 1,18-03 nese 1,18-04 2,18-03 1,18-03 nese 1,18-02 2,18-03 1,18-03 nese 1,18-02 1,18-03 1,18-04 nm 0,08-03 1,18-04 8,18-04 nm 0,08-03 1,18-04 8,18-04 1,18-05 nm 0,08-03 1,18-04 1,18-06 1,18-06 nm 0,08-03 1,18-04 1,18-06 1,18-06 nm 0,08-03 1,18-04 1,18-06 1,18-06 nm 1,08-03 1,18-04 1,18-06 1,18-06 <td>Aluminum</td> <td>8.6B+01</td> <td>5.1B-02</td> <td>1.8E-01</td> <td>4.6B+01</td>	Aluminum	8.6B+01	5.1B-02	1.8E-01	4.6B+01
in in in in in in in in in in in in in i	Arsenic	1.6B+00	3.6E-03	6.6B-04	7.8B-02
inm .00B+00 0.0B+00 0.0B+00 imm .19B-01 1.1B-04 5.3B-04 imm .19B-01 1.1B-04 5.3B-04 imm .2.1B-01 .2.1B-03 .3.3B-04 imm .2.1B-01 .2.2B-03 .1.3B-03 imm .2.2B-01 .2.2B-03 .2.7B-05 imm .2.2B-01 .2.2B-04 .2.2B-04 imm .2.2B-01 .2.2B-04 .2.2B-04 imm .2.2B-01 .2.2B-04 .2.2B-04 imm .2.2B-01 .2.2B-04 .2.2B-04 imm .2.2B-01 .2.2B-04 .2.2B-04 DD .2.2B-03 .2.2B-07 .2.2B-03 imm .2.2B-04 .2.2B-07 .2.2B-03 influoranthene .2.2B-03 .2.2B-03 .2.2B-03 influoranthene .2.2B-03 .2.2B-03 .2.2B-03 influoranthene .2.2B-03 .2.2B-03 .2.2B-03 chlorocthylenes (cis and trans) .2.2B-03 .2.2B-03 .2.2B-03 <td>Barium</td> <td>5.6B-01</td> <td>5.2B-04</td> <td>6.6E-04</td> <td>8.0E-02</td>	Barium	5.6B-01	5.2B-04	6.6E-04	8.0E-02
tum 1.9E-01 1.1B-04 2.1B-01 2.1B-01 2.1B-01 3.1B-03 2.1B-01 3.1B-03 3.1B-03 3.1B-03 3.1B-03 3.1B-03 3.1B-03 3.1B-03 3.1B-03 3.1B-03 3.1B-03 3.1B-03 3.1B-03 3.1B-03 3.1B-04 3.1B-07 3.1B-04 3.1B-07	Cadmium	0.013+00	0.0B+00	0.0E+00	0.0B+00
1.18-01 9.78-05 1.58-03 1.88-10 5.18-01 6.28-04 1.18-03 1.88-10 2.28-03 2.78-03 2.78-03 y 1.88-101 3.08-02 4.08-02 y 2.68-01 1.78-04 8.28-04 m 4.68-02 7.78-04 8.28-04 m 0.08+00 0.08+00 0.08+00 DD 1.18-03 7.28-07 1.88-04 DD 1.18-03 7.28-07 1.88-04 DD 1.18-03 7.28-07 3.89-07 DD 1.18-03 7.28-07 3.89-07 DT 8.48-04 3.38-07 3.89-07 DT 3.28-04 3.38-06 7.38-06 sthylhexylphthalate 3.58-04 3.38-06 7.38-06 athene 3.58-03 3.68-05 3.98-05 chloroethylenes (cis and trans) 2.98-04 2.58-05 3.98-05 sine-chloride 3.18-04 2.78-07 4.78-07 and chloride 3.18-04 2.78-07 4.78-07 sine-chloride 3.18-04 2.78-07 4.78-07 sine-chloride 3.18-04 3.78-07 4.78-07 sine-chloride 3.18-04 3.78-07	Chromium	1.9B-01	1.1B-04	5.3B-04	1.7B-01
F.1B—01 6.2B—04 1.1B—03 nese 1.8B+00 2.2B—03 2.7B—03 y 1.8B+01 3.0B—02 2.7B—03 y 1.1B—02 3.0B—02 4.0B—02 m 4.6B—01 1.7B—04 8.5B—04 m 4.6B—02 7.0B—05 1.8B—04 um 0.0B+00 0.0B+00 0.0B+00 DD 1.1B—03 7.2B—07 1.3B—06 DD 1.1B—03 7.2B=07 3.5B—05 DT 4.0B—04 3.2B=07 3.5B=06 DT 8.4B=04 1.3B=06 7.1B=06 DT 3.2B=04 7.2B=07 3.5B=06 n 7.2B=05 5.8B=08 8.4B=06 n 7.2B=05 5.8B=08 8.4B=06 n 7.2B=05 5.8B=08 8.4B=06 n 3.2B=04 1.3B=04 1.7B=04 sthene 3.1B=04 3.7B=07 4.9B=07 cene chloride 3.1B=04 3.7B=07 4.7B=07	Cobalt	2.1B-01	9.7B-05	1.5E-03	6.3B-01
1.8B+00 2.2B-03 2.7B-03 y 1.8B+01 3.0B-02 4.0B-02 y 1.1B-02 5.7B-06 1.2B-04 m 2.6B-01 1.7B-04 8.5B-04 m 4.6B-02 7.0B-05 1.2B-04 m 0.0B+00 0.0B+00 0.0B+00 um 1.4B-01 3.2B-05 1.8B-04 DD 1.1B-03 7.2B-05 3.2B-02 DD 1.1B-03 7.2B-05 3.2B-05 DD 1.1B-03 7.2B-05 3.2B-05 DD 1.1B-03 7.2B-05 3.2B-05 DD 1.1B-03 7.2B-05 3.2B-05 Afflor-randhene 5.5B-04 3.2B-07 7.1B-06 ethyllexyl)phthalate 1.0B-02 3.5B-06 7.7B-06 chlurene 5.5B-03 6.6B-05 3.0B-05 chlurene 3.0B-05 3.0B-05 3.0B-05 chlurene 3.0B-05 3.0B-05 3.0B-05 chlurene 3.0B-05	Copper	5.1B-01	6.2B-04	1.1B-03	3.5E-01
y 3.0B-02 4.0B-02 y 1.1B-02 5.7B-06 1.2B-04 m 4.6B-01 1.7B-04 8.5B-04 m 4.6B-02 7.0B-05 1.2B-04 m 4.6B-02 7.0B-05 1.8B-04 m 0.0B+00 0.0B+00 0.0B+00 DD 1.4B-01 3.2B-02 3.5B-02 DD 4.0B-04 3.2B-02 3.5B-02 DD 4.0B-04 3.2B-07 7.8B-06 DD 4.0B-04 3.2B-07 7.8B-06 n 7.2B-04 1.6B-06 7.7B-06 kflhoranthene 5.5B-03 6.6B-06 7.7B-06 ethyllexylphthalate 1.0B-02 3.3B-06 1.3B-04 uthrene 5.5B-03 6.6B-06 7.7B-06 chlurosthylene 8.0B-03 2.2B-05 2.9B-05 chlorocthylene 8.0B-03 2.2B-02 3.0B-05 che chloride 1.7B-07 4.7B-07 dorocthylene 1.7B-07 4.7B-07 <td>Lead</td> <td>1.8B+00</td> <td>2.2B-03</td> <td>2.7B-03</td> <td>7.1B-01</td>	Lead	1.8B+00	2.2B-03	2.7B-03	7.1B-01
y 1.1B-02 5.7B-06 1.2B-04 .ch 2.6B-01 1.7B-04 8.5B-04 .m 4.6B-02 7.0B-05 1.8B-04 um 0.0B+00 0.0B+00 0.0B+00 um 1.4B+01 3.2B-02 3.5B-02 DD 1.1B-03 7.2B-07 1.3B-06 DD 4.0B-04 2.8B-07 8.6B-07 DT 4.0B-04 2.8B-07 8.6B-07 DT 8.4B-04 3.3B-07 7.1B-06 r-1260 7.2B-07 7.2B-06 7.1B-06 r-1260 7.2B-04 3.3B-07 7.3B-06 rithene 5.5B-03 6.6B-06 7.7B-06 ethylhexyl)phthalate 1.0B-02 3.3B-04 1.3B-04 rithene 2.1B-02 3.2B-03 5.6B-03 chB-03 9.2B-04 3.2B-05 2.9B-05 chloroethylenes (cis and trans) 2.9B-04 2.7B-07 4.9B-07 ene chloride 3.3B-04 2.7B-07 4.7B-07 ene ch	Manganese	1.8B+01	3.0B-02	4.0B-02	1,4B+01
and 2.6B-01 1.7B-04 8.5B-04 um 4.6B-02 7.0B-05 1.8E-04 um 0.0B+00 0.0B+00 0.0B+00 um 1.4B+01 3.2B-02 3.5B-02 DD 1.1B-03 7.2B-07 1.3B-06 DD 4.0B-04 2.8B-07 8.6B-07 DT 8.4B-04 3.3B-07 7.8B-06 r-1260 9.0B-04 1.6B-06 7.1B-06 r-1260 7.2B-05 8.4B-08 8.4B-08 n 7.2B-05 5.8B-08 8.4B-08 n 7.2B-05 5.8B-08 8.4B-08 ethylhexylphthalate 1.0B-02 3.3B-04 7.7B-06 ethylhexylphthalate 1.0B-02 3.3B-06 1.3B-04 thene 1.0B-02 2.5B-08 8.4B-08 chylhexylphthalate 1.0B-02 2.5B-05 1.3B-05 thene 2.1B-02 2.5B-06 1.3B-05 chylhexylphthalate 1.0B-02 2.5B-05 3.0B-05 chloro	Mercury	1.1B-02	5.7B-06	1.2B-04	5.7B-02
m 4.6B-02 7.0B-05 1.8B-04 um 0.0B+00 0.0B+00 0.0B+00 um 1.4B+01 3.2B-02 3.5B-02 DD 1.1B-03 7.2B-07 1.3B-06 DD 4.0B-04 2.8B-07 8.6B-07 DT 8.4B-04 3.3B-07 7.8B-06 n 7.2B-05 8.4B-08 8.4B-08 kfluoranthene 7.2B-05 8.4B-08 8.4B-08 kfluoranthene 5.5B-03 6.6B-06 7.7B-06 ethyllexyl)phthalate 1.0B-02 3.3B-06 1.3B-04 athene 2.1B-02 2.5B-03 3.0B-05 threne 2.1B-02 2.5B-05 1.5B-05 cthrene 2.2B-03 3.2B-04 4.9B-07 chloroethylenes (cis and trans) 2.9B-04 2.7B-07 4.7B-07 e 5.3B-04 2.7B-07 4.7B-07 e 5.3B-04 2.7B-07 4.7B-07 e 6.6B-05 7.4B-08 9.8B-08 e	Nickel	2.6B-01	1.7B-04	8.5E-04	3.0B-01
dium 0.0B+00 0.0B+00 0.0B+00 DDD 1.4B+01 3.2B-02 3.5B-02 DDD 1.1B-03 7.2B-07 1.3B-06 DDD 4.0B-04 2.8B-07 8.6B-07 DDT 8.4B-04 3.3B-07 7.8B-06 DDT 9.0B-04 1.6B-06 7.1B-06 rin 7.2B-05 8.4B-08 8.4B-08 rin 7.2B-05 7.7B-06 7.7B-06 -ethylhexyl)phthalate 1.0B-02 3.3B-06 7.7B-06 -ethylhexyl)phthalate 1.0B-02 3.3B-06 1.3B-04 anthene 3.0B-03 3.2B-05 1.5B-05 suthrene 8.0B-03 9.2B-05 1.5B-05 sichloroethylenes (cis and trans) 2.3B-04 2.3B-07 4.9B-07 ylene chloride 3.1B-04 3.7B-07 4.7B-07 ylene chloride 1.7B-04 2.2B-07 4.7B-07 shloroethylene 6.6B-05 7.4B-08 9.8B-08 shloroethylene 6.6B-05 7.4B-08	Selenium	4.6E-02	7.0E-05	1.8E-04	7.4B-02
DDD 1.4B+01 3.2B-02 3.5B-02 DDB 1.1B-03 7.2B-07 1.3B-06 DDB 4.0B-04 2.8B-07 8.6B-07 DDT 8.4B-04 3.3B-07 7.8B-06 Or - 1260 7.2B-03 8.4B-08 7.1B-06 rin 7.2B-05 5.8B-08 8.4B-08 rin 7.2B-05 7.7B-06 7.7B-06 -ethylhexyl)phthalate 1.0B-02 3.3B-06 7.7B-06 -ethylhexyl)phthalate 2.1B-02 3.3B-06 1.3B-04 anthene 3.0B-03 3.2B-06 1.5B-05 suthrene 3.0B-03 9.2B-05 1.5B-05 sichloroethylenes (cis and trans) 2.2B-02 2.6B-05 3.0B-05 ylene chloride 3.1B-04 3.7B-07 4.7B-07 ylene chloride 1.7B-04 2.2B-07 2.6B-07 shloroethylene 6.6B-05 7.4B-08 9.8B-08 sine 4.3B-08 1.1B-07 1.1B-07	Vanadium	0.0B+00	0.0E+00	0.0E+00	0.0B+00
DDD 1.1B-03 7.2B-07 1.3B-06 DDB 4.0B-04 2.8B-07 8.6B-07 DDT 8.4B-04 3.3B-07 7.8B-06 Orl-1260 7.2B-05 5.8B-08 8.4B-08 rin 7.2B-05 5.8B-08 8.4B-08 rin 7.2B-05 5.8B-08 8.4B-08 ethylhexyl)phthalate 1.0B-02 3.3B-06 7.7B-06 anthene 2.1B-02 3.3B-06 1.3B-04 anthrene 8.0B-02 3.7B-05 1.5B-05 sighloroethylenes (cis and trans) 2.2B-02 2.6B-05 3.0B-05 ylene chloride 3.1B-04 3.7B-07 4.7B-07 ylene chloride 3.1B-04 3.7B-07 4.7B-07 shloroethylene 6.6B-05 4.3B-07 4.3B-07 shlorofluoromethane 8.6B-05 4.3B-08 4.3B-07 shlorofluoromethane 8.6B-05 4.3B-08 4.1B-07	Zinc	1.4B+01	3.2B-02	3.5B-02	1.5B+01
a.4B-04 2.8B-07 8.4B-07 8.4B-04 3.3B-07 7.8B-06 9.0B-04 1.6B-06 7.1B-06 7.2B-05 5.8B-08 8.4B-08 1.0B-02 3.3B-06 7.7B-06 1.0B-02 3.3B-06 1.3B-04 2.1B-02 2.5B-05 2.9B-05 8.0B-03 9.2B-06 1.5B-05 2.2B-03 6.6B-05 3.0B-05 8.0B-04 5.2B-07 4.9B-07 3.1B-04 2.7B-07 7.1B-07 1.7B-04 3.7B-07 4.7B-07 1.7B-04 2.2B-07 2.6B-07 6.6B-05 4.3B-08 1.1B-07	4,4'-DDD	1.1B-03	7.2B-07	1.3B-06	2.4E-03
8.4B-04 3.3B-07 7.8B-06 9.0B-04 1.6B-06 7.1B-06 7.2B-05 5.8B-08 8.4B-08 1.0B-02 3.3B-06 7.7B-06 1.0B-02 3.3B-06 1.3B-04 2.1B-02 2.5B-05 2.9B-05 8.0B-03 9.2B-06 1.5B-05 1.0B-02 2.6B-05 3.0B-05 2.2B-03 2.6B-05 3.0B-05 3.3B-04 5.2B-07 4.9B-07 3.1B-04 3.7B-07 7.1B-07 1.7B-04 3.7B-07 2.6B-07 6.6B-05 4.3B-08 9.8B-08 3.ane 8.6B-05 4.3B-08 1.1B-07	4,4'-DDB	4.0B-04	2.8B-07	8.6B-07	2.2B-03
Pobb-04 1.6B-06 7.1B-06 7.2B-08 8.4B-08 8.4B-08 8.4B-08 8.4B-08 8.4B-08 8.4B-08 1.0B-02 3.3B-06 7.7B-06 7.7B-06 7.7B-06 7.7B-02 3.2B-02 2.5B-05 2.9B-05 8.0B-03 9.2B-06 1.5B-05 2.2B-05 2.2B-07 8.0B-07 7.2B-07 7.1B-0	4,4'-DDT	8,4B-04	3.3B-07	7.8B-06	3.5B-03
1.2B—0.5 5.8B—0.8 8.4B—0.8 1.1B=0.6 1.2B=0.6 1.2B=0.6 1.2B=0.6 1.2B=0.6 1.2B=0.7 1.2	Aroclor-1260	9.0B-04	1.6B-06	7.1B-06	6.4B-03
tribalate 1.0B-02 3.3B-06 7.7B-06 1.0B-02 3.3B-06 1.3B-04 2.1B-02 2.5B-05 2.9B-05 8.0B-03 9.2B-06 1.5B-05 2.2B-02 2.6B-05 3.0B-05 2.2B-04 5.2B-07 4.9B-07 3.1B-04 3.7B-07 7.1B-07 1.7B-04 3.7B-07 7.1B-07 3.1B-04 3.7B-07 7.1B-07 4.3B-08 9.8B-08 8.6B-05 4.3B-08 1.1B-07	Dieldrin	7.2B-05	5.8B-08	8.4B-08	9.7B-05
tribalate 1.0B-02 3.3B-06 1.3B-04 2.1B-02 2.5B-05 2.9B-05 8.0B-03 9.2B-06 1.5B-05 2.2B-02 2.0B-05 3.0B-05 2.2B-04 5.2B-07 4.9B-07 5.3B-04 2.7B-07 7.1B-07 3.1B-04 3.7B-07 4.7B-07 1.7B-04 2.2B-07 2.6B-07 6.6B-05 4.3B-08 1.1B-07	Benzo[k]fluoranthene	5.5E-03	6.6B-06	7.7E-06	1.7B-03
2.1B-02 2.5B-05 2.9B-05 8.0B-05 8.0B-03 8.0B-03 2.2B-06 1.5B-05 3.0B-05 3.0B-05 3.0B-05 3.0B-07 4.9B-07 7.1B-07 3.1B-04 3.7B-07 4.7B-07 4.7B-07 6.6B-05 4.3B-08 1.1B-07 3.4B-07 3.4B-08 3.8B-08 3.8B-08 3.8B-08 3.8B-08 3.8B-08 3.8B-08 3.8B-08 3.8B-07 3.8B-07 3.8B-08 3.8B-08 3.8B-07 3.8B-0	Bis(2-ethylhexyl)phthalate	1.0B-02	3.3B-06	1.3E-04	6.1B-02
8.0B-03 9.2B-06 1.5B-05 2.2B-02 2.6B-05 3.0B-05 2.9B-04 5.2B-07 4.9B-07 5.3B-04 2.7B-07 7.1B-07 3.1B-04 3.7B-07 4.7B-07 6.6B-05 7.4B-08 9.8B-08 8.6B-05 4.3B-08 1.1B-07	Fluoranthene	2.1B-02	2.5B-05	2.9E-05	6.3B-03
2.2B-02 2.6B-05 3.0B-05 2.9B-04 5.2B-07 4.9B-07 5.3B-04 2.7B-07 7.1B-07 3.1B-04 3.7B-07 4.7B-07 1.7B-04 2.2B-07 2.6B-07 6.6B-05 7.4B-08 9.8B-08 8.6B-05 4.3B-08 1.1B-07	Phenanthrene	8.0E-03	9.2B-06	1.5E-05	4.4E-03
2.9B-04 5.2B-07 4.9B-07 5.3B-07 5.3B-07 3.1B-07 7.1B-07 7.1B-07 3.1B-04 3.7B-07 4.7E-07 7.2B-07 6.6E-05 7.4B-08 9.8B-08 3.1B-07 3.3B-08 1.1B-07	Pyrene	2.2B-02	2.6B-05	3.0B-05	6.6B-03
3.3B-04 2.7B-07 7.1B-07 3.1B-04 3.7B-07 4.7B-07 1.7B-04 2.2B-07 2.6B-07 6.6B-05 7.4B-08 9.8B-08 8.6B-05 4.3B-08 1.1B-07	1,2-Dichloroethylenes (cis and trans)	2.9B-04	5.2B-07	4.9B-07	3.3B-05
3.1B-04 3.7B-07 4.7B-07 1.7B-04 2.2B-07 2.6B-07 6.6B-05 7.4B-08 9.8B-08 8.6B-05 4.3B-08 1.1B-07	Acetone	5.3E-04	2.7B-07	7.1B-07	6.7B-05
1.7B-04 2.2B-07 2.6B-07 6.6B-05 7.4B-08 9.8B-08 8.6B-05 4.3B-08 1.1B-07	Methylene chloride	3.1B-04	3.7B-07	4.7E-07	3.7B-05
6.6E-05 7.4E-08 9.8E-08 8.6E-05 4.3E-08 1.1E-07	Tetrachloroethylene	1.7E-04	2.2B-07	2.6B-07	2.0E-05
8.6B -05 4.3B -08 1.1B -07	Toluene	6.6E-05	7.4E-08	9.8E-08	7.8B-06
	Trichlorofluoromethane	8.6B-05	4.3E-08	1.1B-07	1.1B-05

Table O-2.10
Estimated Chronic Exposure to Semi-Aquatic Receptors from Ingestion of Average Exposure Concentrations of CPCs in Food, Filtered Surface Water, and Sediment Area 2

Remedial Investigation Report, AOC 57 Devens, Massachusetts

POTENTIAL DIETARY EXPOSURE (mg/kgBW-day) [c]

cone 0.0B+00 cone 0.0B+00 0.0B+00 3.9B-03 0.0B+00 0.0B+00 0.0B+00 2.9B-05
0.0B+00 0.0B+00 0.0B+00 0.0B+00 0.0B+00 0.0B+00 3.9B-03 1.6B-06 6.2B-06 0.0B+00 0.0B+00 0.0B+00 0.0B+00 0.0B+00 0.0B+00 3.3B-05 5.8B-08 5.4B-08 0.0B+00 0.0B+00 0.0B+00 2.9B-05 5.1B-08 4.7B-08
0.0B+00 0.0B+00 0.0B+00 3.9B-03 1.6B-06 6.2B-06 0.0B+00 0.0B+00 0.0B+00 0.0B+00 0.0B+00 0.0B+00 3.3B-05 5.8B-08 5.4B-08 0.0B+00 0.0B+00 0.0B+00 2.9B-05 5.1B-08 4.7B-08
3.9B-03 1.6B-06 6.2B-06 0.0B+00 0.0B+00 0.0B+00 0.0E+00 0.0B+00 0.0B+00 3.3B-05 5.8B-08 5.4B-08 0.0B+00 0.0B+00 0.0B+00 2.9B-05 5.1B-08 4.7B-08
0.0B+00 0.0B+00 0.0B+00 0.0B+00 0.0B+00 0.0B+00 3.3B-05 5.8B-08 5.4B-08 0.0B+00 0.0B+00 0.0B+00 2.9B-05 5.1B-08
0.0E+00 0.0E+00 0.0E+00 3.3E-05 5.8E-08 5.4E-08 0.0B+00 0.0B+00 0.0B+00 2.9E-05 5.1E-08
3.3E-05 5.8E-08 5.4E-08 0.0E+00 0.0E+00 0.0E+00 2.9E-05 5.1E-08
0.0B+00 0.0B+00 0.0B+00 2.9B-05 5.1B-08 4.7B-08
2,9B-05 5.1B-08 4.7B-08
1.4B-07
Xv ene
0.014.00 0.014.00
0.014.00 0.014.00

[[]e] Calculated by summing the products of individual prey type concentrations and percent in diet with surface water and sediment exposures, multiplying by the exposure duration, SFF and ingestion rate, and dividing by body weight (Table 9-27).

Table O-Z.10 Exposure Parameters and Assumptions for Semi-Aquatic Receptors Area 2

Remedial Investigation Report, AOC 57 Devens, Massachusetts

EXPOSURE PARAMETERS [4]

Indicator Species	Aquate Organisms		Plans	Home Range Sediment (acres)	- Si	BD [e]	Site Foraging Frequency [f]	Dietary W Ingestion Inge Rate R (kg/day) (L/	Water B Ingestion W/ Rate ((L/day)	Body Weight (kg)
Mwkrat	(Small herb. mammal)	10%	80%	10%	0.2	1	1.00E+00	0.084	0.12	1.27
Mallard	(Herb. bird)	1%	91%	2%	235	1	2.98E-03	0.063	0.064	1.134
Raccoon	(Predatory mammal)	91%	%0	%6	385	-	1.82B-03	0.214	0.344	3.99
Great blue heron	(Piscivorous bird)	98%	0%	2%	1.5	0.5	4.67B-01	0.401	0.101	2.23

NOTES:

[d] Documentation of exposure parameters presented in:

Appendix O, Table O-1.1

[e] BD = Exposure Duration (percentage of year receptor is expected to be found at study area)
[f] SFR = Site Foraging Frequency (calculated by dividing site area by receptor home range (cannot exceed 1.0))

0.7 acres
0.7 acres
SITE AREA:

Table O Z.11 Estimated Chronic Exposure to Semi-Aquatic Receptors from Ingestion of RME Exposure Concentrations of CPCs in Food, Unfiltered Surface Water, and Sediment Area 3

Remedial Investigation Report, AOC 57 Devens, Massachusetts

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EXPOSURE CONCENTRATION DATA	TRATION DATA		ESTIMA
	RME	RME UNFILT.	
	SEDIMENT	SURFACE WATER	Aquatic
CHEMICAL	CONCENTRATION	CONCENTRATION	Organisı
	(mg/kg)	(mg/L)	BCF[a
Arsenic	Not a CP	1.5B-01	Ÿ
Barium	Not a CP	2.8E-01	Ÿ
Copper	Not a CP	4.4B-02	3.4B+(
Lead	Not a CP	1.8B-01	₩
Selenium	Not a CP	2.5E-03	Ÿ
Zinc	Not a CP	4.5B-01	Ÿ
4,4'-DDD	1.5B-01	Not a CPC	
Aroclor-1260	8.4B-01	Not a CP¢	_
Benzo[k]fluoranthene	2.8E-01	9.4E-04	_
Fluoranthene	6.5B-01	Not a CPC	
Phenanthrene	3.7E-01	Not a CP¢	3.2B+(
Pyrene	5.6B-01	Not a CPC	
Acetone	2.1E-01	Not a CP¢	
Toluene	4.8B-03	1.6E-03	
1,2-Dichlorobenzene	3.9E-01	Not a CP¢	
1,4-Dichlorobenzene	1.0B+00	Not a CPC	
Benzo(b)fluoranthene	4.9B-01	Not a CPC	
Chrysene	3.4B-01	Not a CPC	
Naphthalene	5.3B-01	Not a CP¢	_
Benzene	3.7B-02	Not a CP¢	~
Carbon disulfide	Not a CP	5.8E-04	
Chlorobenzene	1.9B-02	4.6B-03	
Xylene	1.1B-02	Not a CPC	_
Antimony	Not a CP	5.6B-03	Ÿ
		_	

ESTIMATED TISSUE LEVELS IN PRIMARY PREY ITEMS

поо	rue	surc	(Kg.)	0.0E+00	0.0E+00	1.5E+01	0.0E+00	0.0B+00	0.0E+00	0.0B+00 [b]	7.3E-02 [b]	1.4B-02	3.3B-02	1.8臣-02	2.8B-02	NA	NA	2.0B-02	5.0E-02	2.5B-02	1.7B-02	2.7B-02	NA	NA	NA	NA	0.0E+00	70+90
Raccoon	Aquatic Tissuc	Plant Exposure	BAF[n] (mg/kg)	3.0B-01 0.0	2.5B-02 0.0	6.0E-02 1.5	5.6B-02 0.0	1.6B-01 0.0	9.2B-01 0.0	NA 1.0B-02 0.0	1.2B-01 7.3	4.9B-02 1.4	4.9B-02 3.3	4.9B-02 1.8	4.9B~02 2.8	NA	NA	7.3E-02 2.0	7.3B-02 5.0	2.5B-02 2.5	2.5E-02 1.7	2.5E-02 2.7	NA	NA	NA	NA	4.0E-02 0.0	_
Aq. Org.	Tissue 4	Level	(mg/kg)	0.0B+00	0.0B+00	1.5B+01	0.0E+00	0.0E+00	0.0B+00		NA	1.4B-02	3.3B-02	1.8B-02	2.8B-02	NA	NA	2.0B-02	5.0B-02	2.5B-02	1.7B-02;	2.7B-02	0.0E+00	0.0B+00	0.0B+00	0.0B+00	0.0B+00	0.0B + 00
	Aquatic	Organism	BAF[a]	6.6B-03	7.5B-03	1.6B-01	7.8B-02	7.6B-01	1.8E+00	NA	NA	5.0B-02	5.0B-02	5.0B-02	5.0B-02	NA	NA	5.0B-02	5.0E-02	5.0B-02	5.0B-02	5.0B-02	NA	NA	NA	NA	NA	
	Aquatio	Organism	BCF[a]	<300	<300	3.4B+02	<300	<300	<300	NA	NA	NA	NA	3.2B+02	NA	NA	NA	NA	AN	NA	NA	NA	NA	NA	ΝA	NA	<300) (300

BAFs are multiplied by sediment concentrations and BCFs are multiplied by the surface water concentrations; BCFs <300 were not used as per USEPA (1989). The aquatic organism tissue level is equal to the greater of the two products. [b] Measured crayfish and fish tissue concentrations (provided in Table O-1.3). Appendix O, Tables O-1.2 and O-1.3 [a] Bioaccumulation data presented in:

Table O-2.11
Estimated Chronic Exposure to Semi-Aquatic Receptors from Ingestion of RME Exposure Concentrations of CPCs in Food, Unfiltered Surface Water, and Sediment Area 3

Remedial Investigation Report, AOC 57 Devens, Massachusetts

POTENTIAL DIETARY EXPOSURE (mg/kgBW-day) [c]

CHEMICAL Haccoon	
Arsenic	6.9B-06
Barium .	1.2E-05
Copper	3.8B-04
Lead	8.2E-06
Selenium	1.1B-07
Zinc	2.0B-05
4,4'-DDD	3.8B~07
Aroclor-1260	4.0B~06
Benzo[k]fluoranthene	1.1B-06
Fluoranthene	2.5E-06
Phenanthrene	1.4B - 06
Pyrene	2.1B-06
Acetone	S.3B-07
Toluene	8.4E-08
1,2-Dichlorobenzene	1.5B-06
1,4-Dichlorobenzene	3.8B-06
Benzo(b)fluoranthene	1.8B-06
Chrysene	1.3B-06
Naphthalene	2.0B-06
Benzene	9.3B-08
Carbon disulfide	2.6B-08
Chlorobenzene	2.5E-07
Xylene	2.8B-08
Antimony	2.5B-07

[c] Calculated by summing the products of individual prey type concentrations and percent in diet with surface water and sediment exposures, multiplying by the exposure duration, SFF and ingestion rate, and dividing by body weight (Table 9-27).

Table O-Z.11
Exposure Parameters and Assumptions for Semi-Aquatic Receptors Area 3

Remedial Investigation Report, AOC 57 Devens, Massachusetts

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	Body Weight (kg)	3.99
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	Water Ingestion Rate (L/day)	0
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	Dietary Ingestion Rate (kg/day)	
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	Home Ran Sediment (acres)	
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; [q]		
(S [d]		
RS [d]		(Predatory mammal) 91%
ers[d]		
Ters [d]		
BTERS [d]		
METERS [d]		
AMBTERS [d]		
(AMETERS [d]	Aquatic Organisms	
ARAMETERS [d]	Aquatic Organisms	
PARAMETERS [d]	Aquatic Organisms	
PARAMETERS [d]	Aquatic Organisms	
B PARAMETERS [d]	Aquatic Organisms	
RE PARAMETERS [d]	Aquatic Organisms	
TRE PARAMETERS [d]	Aquatic Organisms	. (Predatory mammal)
SURE PARAMETERS [d]	Aquatic Organisms	. (Predatory mammal)
SURE PARAMETERS [d]	Aquatic Organisms	. (Predatory mammal)
OSURE PARAMETERS [d]	Aquatic Organisms	. (Predatory mammal)
TPOSURE PARAMETERS [d]	Aquatic Organisms	. (Predatory mammal)
XPOSURE PARAMETERS [d]	Aquatic Organisms	
EXPOSURE PARAMETERS [d]	Aquatic Organisms	. (Predatory mammal)
EXPOSURE PARAMETERS [d]	Aquatic Organisms	. (Predatory mammal)

NOTES:

Appendix O, Table 0-1.1 [d] Documentation of exposure parameters presented in:

[e] BD = Bxposure Duration (percentage of year receptor is expected to be found at study area)

[f] SFF = Site Foraging Frequency (calculated by dividing site area by receptor home range (cannot exceed 1.0))

0.2 acres STTE AREA:

Risk from Potential Lethal or Sublethal Effects for Terrestrial Receptors from RME Concentrations of CPCs in Food and Surface Soil Table 0-2.12

Area 2 Upland Remedial Investigation Report, AOC 57 Devens, Massachusetts

	•						L	3.5	
ANALYTE	PDE -	White-tooted mouse RTV HQ	esnom E	PDE	American robin RTV	HQ	PDE	RTV RTV	О́Н
Arsenic	7.3E-01	5.8E-01	1.3E+00	6.1E-01	1.0E+00	6.1E-01	2.4E-05	5.8E-01	4.2E-05
Cobalt	1.1E-01	4.2E+00	2.7E-02	3.5E-01	4.2E+00	8.3E-02	3.7E-05	4.2E+00	8.8E-06
Copper	1.4E+00	1.0E+02	1.4E-02	1.0E+00	1.0E+02	1.0E-02	9.6E-05	1.0E+02	9.6E-07
Manganese	3.9E+00	4.5E+01	8.6E-02	7.0E+00	4.5E+01	1.5E-01	2.8E-04	4.5E+01	6.3E-06
Nickel	2.0E-01	1.3E+01	1.5E-02	6.0E-01	5.0E+01	1.2E-02	4.1E-05	1.3E+01	3.2E-06
Selenium	1.1E-02	2.0E-01	5.6E-02	3.4E-02	6.0E-01	5.6E-02	3.1E-06	2.0E-01	1.6E-05
4,4'-DDE	4.8E-04	2.0E-01	2.4E-03	1.4E-03	3.9E-01	3.6E-03	1.9E-07	1.2E+01	1.6E-08
4,4"-DDT	2.7E-04	2.0E-01	1.4E-03	8.2E-04	1.4E-01	5.8E-03	1.0E-07	1.2E+01	8.6E-09
2-Methylnaphthalene	3.6E-03	1.0E+01	3.6B-04	6.7E-03	1.0E+01	6.7E-04	3.3E-07	1.0E+01	3.3E-08
Bis(2—ethylhexyl)phthalate	1.0E-02	3.5E+01	3.0E-04	3.5E-02	3.5E+01	1.0E-03	1.9E-06	3.5E+01	5.4E-08
Dibenzofuran	1.1E-03	1.3E+01	8.5E-05	2.3E-03	1.3E+01	1.9E-04	1.2E-07	1.3E+01	9.4E-09
Fluoranthene	2.5E-03	1.0E+01	2.5E-04	4.6E-03	1.0E+01	4.6E-04	2.3E-07	1.0E+01	2.3E-08
Naphthalene	3.5E-03	3.6E+01	9.9E-05	6.5E-03	3.6E+01	1.8E-04	3.3E-07	3.6E+01	9.1E-09
Phenanthrene	2.3E-03	1.0E+01	2.3E-04	4.3E-03	1.0E+01	4.3E-04	2.2E-07	1.0E+01	2.2E-08
Pyrene	3.3E-03	1.0E+01	3.3E-04	6.2E-03	1.0E+01	6.2E-04	3.1E-07	1.0E+01	3.1E-08
Chloroform	2.2E-06	1.6E+02	1.3E-08	9.5E-06	1.6E+02	5.8E-08	4.0E-10	1.6E+02	2.4E-12
Ethylberzene	5.9E-06	2.9E+02	2.0E-08	2.6E-05	2.9E+02	8.8E-08	1.1E-09	2.9E+02	3.7E-12
Tetrachloroethylene	7.3E-06	1.0E+02	7.4E-08	3.2E-05	1.0E+02	3.2E-07	1.3E-09	1.0E+02	1.3E-11
Toluene	9.1E~06	7.6E+01	1.2E-07	4.0E-05	7.6E+01	5.2E-07	1.6E-09	7.6E+01	2.2E-11
Trichlorofluoromethane	4.2E-05	3.5E+01	1.2E-06	1.8E-04	3.5E+01	5.2E-06	7.6E-09	3.5E+01	2.2E-10
Xylenes	7.1E-05	5.0E+02	1.4E-07	3.1E-04	5.0E+02	6.2E-07	1.3E-08	5.0E+02	2.6E-11
						_			
SUMMARY HAZARD INDEX			1.5E+00			9.4E-01			7.7E-05
PDE = Potential Dietary Exposure (mg/kgBW/day)		RTV = Reference Toxicity Value (mg/kgBW/day)	Toxicity Value (1	mg/kgBW/day)	H	Q = Hazard Que	otient (calculate	HQ = Hazard Quotient (calculated by dividing PDE by RTV)	E by RTV)

Table O-2.12 Risk from Potential Lethal or Sublethal Effects for Terrestrial Receptors from RME Concentrations of CPCs in Food and Surface Soil Area 2 Upland Remedial Investigation Report, AOC 57 Devens, Massachusetts

ANALYTE	8	Barred owl	
	PDE	RTV	НО
Arsenic	9.0E-05	1.0E+00	9.0E-05
Cobalt	1.9E-04	4.2E+00	4.5E-05
Copper	5.6E-04	1.0E+02	5.6E-06
Manganese	1.5E-03	4.5E+01	3.3E-05
Nickel	1.8E-04	5.0E+01	3.6E-06
Selenium	1.2E-05	6.0E-01	2.1E-05
4,4'-DDE	1.6E-06	3.9E-01	4.2E-06
4,4'-DDT	9.9E-07	1.4E-01	7.1E-06
2-Methylnaphthalene	1.8E-06	1.0E+01	1.8E-07
Bis(2-ethylhexyl)phthalate	1.2E-05	3.5E+01	3.3E-07
Dibenzofuran	6.5E-07	1.3E+01	5.2E-08
Fluoranthene	1.3E-06	1.0E+01	1.3E-07
Naphthalene	1.8E-06	3.6E+01	4.9E-08
Phenanthrene	1.2E-06	1.0E+01	1.2E-07
Pyrene	1.7E-06	1.0E+01	1.7E-07
Chloroform	2.6E-09	1.6E+02	1.6E-11
Ethylbenzene	6.9E-09	2.9E+02	2.4E-11
Tetrachloroethylene	8.7E-09	1.0E+02	8.7E-11
Toluene	1.1E-08	7.6E+01	1.4E-10
Trichlorofluoromethane	4.9E-08	3.5E+01	1.4E-09
Xylenes	8.4E-08	5.0E+02	1.7E-10

RTV = Reference Toxicity Value (mg/kgBW/day) SUMMARY HAZARD INDEX
PDE = Potential Dietary Exposure (mg/kgBW/day)

2.1E-04

HQ = Hazard Quotient (calculated by dividing PDE by RTV)

UPSSMAX

Table O-2.13
Risk from Potential Lethal or Sublethal Effects for Terrestrial Receptors from Average Exposure Concentrations of CPCs in Food and Surface Soil

Area 2 Upland Remedial Investigation Report, AOC 57 Devens, Massachusetts

ANALYIB		White-footed mouse	4 mouse		American robin			Red fox	
	PDE	RTV	НО	PDE	RTV	HQ	PDE	RTV	НО
Arsenic	5.1E-01	5.8E-01	8.7E-01	4.2E-01	1.0E+00	4.2E-01	1.7E-05	5.8E-01	2.9E-05
Cobalt	7.0E-02	4.2E+00	1.7E-02	2.1E-01	4.2E+00	5.1E-02	2.3E-05	4.2E+00	5.4E-06
Copper	9.7E-01	1.0E+02	9.7E-03	7.0E-01	1.0E+02	7.0E-03	6.7E-05	1.0E+02	6.7E-07
Manganese	2.3E+00	4.5E+01	5.1E-02	4.1E+00	4.5E+01	9.1E-02	1.7E-04	4.5E+01	3.7E-06
Nickel	1.1E-01	1.3E+01	8.5E-03	3.3E-01	5.0E+01	6.6E-03	2.3E-05	1.3E+01	1.7E-06
Selenium	3.6E-03	2.0E-01	1.8E-02	1.1E-02	6.0E-01	1.8E-02	1.0E-06	2.0E-01	5.0E-06
4,4'-DDE	1.7E-04	2.0E-01	8.4E-04	4.9E-04	3.9E-01	1.3E-03	6.6E08	1.2E+01	5.5E-09
4,4'-DDT	8.4E-05	2.0E-01	4.2E-04	2.5E-04	1.4E-01	1.8E-03	3.2E-08	1.2E+01	2.6E-09
2-Methylnaphthalene	1.7E-03	1.0E+01	1.7E-04	3.1E-03	1.0E+01	3.1E-04	1.6E-07	1.0E+01	1.6E-08
Bis(2-ethylhexyl)phthalate	6.2E-03	3.5E+01	1.8E-04	2.1E-02	3.5E+01	5.9E-04	1.1E-06	3.5E+01	3.2E-08
Dibenzofuran	5.5E-04	1.3E+01	4.4E-05	1.2E-03	1.3E+01	9.6E-05	6.1E-08	1.3E+01	4.9E-09
Fluoranthene	1.3E-03	1.0E+01	1.3E-04	2.5E-03	1.0E+01	2.5E-04	1.2E-07	1.0E+01	1.2E-08
Naphthalene	1.8E-03	3.6E+01	4.9E-05	3.3E-03	3.6E+01	9.1E-05	1.6E-07	3.6E+01	4.6E-09
Phenanthrene	1.3E-03	1.0E+01	1.3E-04	2.3E-03	1.0E + 01	2.3E-04	1.2E-07	1.0E+01	1.2E-08
Pyrene	1.5E-03	1.0E+01	1.5E-04	2.8E-03	1.0E+01	2.8E-04	1.4E-07	1.0E+01	1.4E-08
Chloroform	1.3E-06	1.6E+02	7.9E-09	5.7E-06	1.6E+02	3.5E-08	2.4E-10	1.6E+02	1.4E-12
Ethylbenzene	2.9E-06	2.9E+02	1.0E-08	1.3E-05	2.9E+02	4.4E-08	5.3E-10	2.9E+02	1.8E-12
Tetrachloroethylene	2.3E-06	1.0E+02	2.3E-08	9.9E-06	1.0E+02	9.9E-08	4.1E-10	1.0E+02	4.1E-12
Toluene	4.2E-06	7.6E+01	5.5E-08	1.8E-05	7.6E+01	2.4E-07	7.6E-10	7.6E+01	9.9E-12
Trichlorofluoromethane	1.8E-05	3.5E+01	5.2E-07	8.0E-05	3.5E+01	2.3E-06	3.3E-09	3.5E+01	9.5E-11
Xylenes	1.6E-05	5.0E+02	3.1E-08	6.9E-05	5.0E+02	1.4E-07	2.8E-09	5.0E+02	5.7E-12
٠									
									
							•		
28.									
SUMMARY HAZARD INDEX			9.8E01			6.0E-01			4.5E-05
PDE = Potential Dietary Exposure (mg/kgBW/day)		RTV = Reference Toxicity Value (mg/kgBW/day)	Toxicity Value (1	mg/kgBW/day)	Ĥ	Q = Hazard Qu	otient (calculated	HQ = Hazard Quotient (calculated by dividing PDE by RTV)	E by RTV)

Table O-2.13

Risk from Potential Lethal or Sublethal Effects for Terrestrial Receptors from Average Exposure Concentrations of CPCs in Food and Surface Soil Area 2 Upland

Remedial Investigation Report, AOC 57 Devens, Massachusetts

ANALYTE	B	Barredowl	
	PDE	RTV	НО
Arsenic •	6.2E-05	1.0E+00	6.2E-05
Cobalt	1.2E-04	4.2E+00	2.8E-05
Copper	3.9E-04	1.0E+02	3.9E-06
Manganese	8.7E-04	4.5E+01	1.9E-05
Nickel	1.0E-04	5.0E+01	2.0E-06
Selenium	3.9臣—06	6.0E-01	6.6E-06
4,4'-DDE	5.8E-07	3.9E-01	1.5E-06
4,4'-DDT	3.1E-07	1.4E-01	2.2E-06
2-Methylnaphthalene	8.4E-07	1.0E+01	8.4E08
Bis(2-ethylhexyl)phthalate	6.9E-06	3.5E+01	2.0E-07
Dibenzofuran	3.4E-07	1.3E+01	2.7E-08
Fluoranthene	6.7E-07	1.0E+01	6.7E-08
Naphthalene	8.8E07	3.6E+01	2.5E-08
Phenanthrene	6.3E-07	1.0E+01	6.3E-08
Pyrene	7.6E-07	1.0E+01	7.6E-08
Chloroform	1.5E-09	1.6E+02	9.3E-12
Ethylbenzene	3.5E-09	2.9E+02	1.2E-11
Tetrachloroethylene	2.7E-09	1.0E+02	2.7E-11
Toluene	4.9E-09	7.6E+01	6.5E-11
Trichlorofluoromethane	2.2E-08	3.5E+01	6.2E-10
Xylenes	1.8E-08	5.0E+02	3.7E-11

SUMMARY HAZARD INDEX
1.31

PDE = Potential Dietary Exposure (mg/kgBW/day)

RTV = Reference Toxicity

RTV = Reference Toxicity Value (mg/kgBW/day)



Table O --:2.14

Risk from Potential Lethal or Sublethal Effects for Terrestrial Receptors from RME Concentrations of CPCs in Food and Surface Soil

Area 2 Floodplain Remedial Investigation Report, AOC 57 Devens, Massachusetts

ANALYTE		White-footed mouse	1 mouse	Y	American robin	ura	Re	Нассооп	
	PDE	RTV	НО	PDE	RTV	HQ	PDE	RTV	ОН
Antimony	1.2E-02	4.2E+01	2.9E-04	1.5E-02	4.2E+01	3.6E-04	8.1E-06	4.2E+01	1.9E-07
Copper	3.5E+00	1.0E+02	3.5E-02	1.6E+00	1.0E+02	1.6E-02	9.8E-04	1.0E+02	9.8E-06
Lead	1.4E+00	2.5E+00	5.6E-01	2.8E+00	7.5E+01	3.7E-02	1.4E - 03	2.5E+00	5.7E-04
Selenium	5.6E-02	2.0E-01	2.8E-01	1.0E-01	6.0E-01	1.7E-01	4.2E-05	2.0E-01	2.1E-04
4,4'-DDE	1.5E-03	2.0E-01	7.5E-03	2.7E-03	3.9E-01	7.0E-03	1.0E-06	1.2E+01	8.6E-08
Aroclor-1260	3.1E-01	6.4E+00	4.9E-02	5.0E-01	9.0E-01	5.6E-01	2.6E-04	7.5E-03	3.5E-02
Dieldrin	1.8E-03	6.5E-01	2.8E-03	3.2E-03	6.0E-01	5.4E-03	1.2E-06	6.5E-01	1.9E-06
Di-n-butylphthalate	3.0E-03	1.1E+00	2.7E-03	6.2E-03	1.1E+00	5.7E-03	3.3E-06	1.1E+00	3.0E-06
Fluoranthene	1.7E-02	1.0E+01	1.7E-03	1.9E-02	1.0E+01	1.9E-03	1.1E-05	1.0E+01	1.1E-06
Phenanthrene	8.4E-03	1.0E+01	8.4E-04	9.7E-03	1.0E+01	9.7E-04	5.3E-06	1.0E+01	5.3E-07
Pyrene	1.7E-02	1.0E+01	1.7E-03	1.9E-02	1.0E+01	1.9E-03	1.1E-05	1.0E+01	1.1E-06
Methylene chloride	2.0E-05	5.3E+01	3.8E-07	5.4E-05	5.3E+01	1.0E-06	3.0E-08	5.3E+01	5.8E-10
Tetrachloroethylene	3.4E-06	1.0E+02	3.4E-08	9.4E-06	1.0E+02	9.4E-08	5.3E-09	1.0E+02	5.3E-11
Toluene .	1.2E-05	7.6E+01	1.6E-07	3.4E-05	7.6E+01	4.5E-07	1.9E-08	7.6E+01	2.5E-10
Trichlorofluoromethane	1.8E-05	3.5E+01	5.0E-07	4.8E-05	3.5E+01	1.4E-06	2.7E-08	3.5E+01	7.7E-10
4,4'-DDD	4.4E-04	2.0压一01	2.2E-03	8.0E-04	1.4E-01	5.7E-03	3.0E-07	1.2E+01	2.5E-08
4,4'-DDT	1.9E-03	2.0E-01	9.5E-03	3.5E-03	1.4E-01	2.5E-02	1.6E-06	1.2E+01	1.3E-07
2-Methylnaphthylene	2.2E-03	1.0E+01	2.2E-04	3.3E-03	1.0E+01	3.3E-04	1.8E-06	1.0E+01	1.8E-07
Acenaphthylene	1.5E-03	1.0E+01	1.5E-04	2.3E-03	1.0E+01	2.3E-04	1.2E-06	1.0E+01	1.2E-07
Benzo(k)fluoranthene	3.5E-03	1.0E+01	3.5E-04	5.3E-03	1.0E+01	5.3E-04	2.8E-06	1.0E+01	2.8E-07
Chrysene	4.1E-03	1.0E+01	4.1E-04	6.2E-03	1.0E+01	6.2E-04	3.3E-06	1.0E+01	3.3E-07
Naphthalene	1.7E-03	3.6E+01	4.9E-05	2.6E-03	3.6E+01	7.4E-05	1.4E-06	3.6E+01	4.0E-08
1,2-Dichloroethylene (cis and trans)	1.7E-05	3.0E+01	5.6E-07	4.6E-05	3.0E+01	1.5E-06	2.6E-08	3.0E+01	8.7E-10
Acetone	1.6E-04	6.0E+02	2.7E-07	4.5E-04	6.0E+02	7.5E-07	2.5E-07	6.0E+02	42E-10
Ethylbenzene	1.4E-05	2.9E+02	5.0E-08	4.0E-05	2.9E+02	1.4E-07	2.2E-08	2.9E+02	7.6E-11
Arsenic	1.7E+00	5.8E-01	2.9E+00	8.8E-01	1.0E+00	8.8E-01	5.2E-04	5.8E-01	9.0E-04
Barium	6.1E-01	2.0E+02	3.1E-03	8.5E-01	2.0E+02	4.3E-03	4.8E-04	2.0E+02	2.4E-06
Manganese	2.2E+00	4.5E+01	4.9B-02	2.5E+00	4.5E+01	5.5E-02	1.4E-03	4.5E+01	3.1E-05
Zinc	1.4E+01	2.0E+02	6.8E-02	1.0E+01	2.0E+02	5.2E-02	6.0E-03	2.0E+02	3.0E-05
STRANABY HAZABU INDEX			A OFFICE			1 90 1 00			8
SOMMAN I THALMAN MADEA			4.0E-T-00			1.05.+00			3.75-02

PDE = Potential Dietary Exposure (mg/kgBW/day)

RTV = Reference Toxicity Value (mg/kgBW/day)

Risk from Potential Lethal or Sublethal Effects for Terrestrial Receptors from RME Concentrations of CPCs in Food and Surface Soil Area 2 Floodplain Remedial Investigation Report, AOC 57 Table O-2.14

Devens, Massachusetts

ANALYTE	B	Barredowl		S	Short-tailed shrew	shrew
	PDE	RTV	HQ	PDE	RTV	HO
Antimony	3.0E-06	4.2E+01	7.3E-08	1.0E-02	4.2E+01	2.5E-04
Copper	3.7E-04	1.0E+02	3.7E-06	5.5E-01	1.0E+02	5.5E-03
	5.9E-04	7.5E+01	7.8E-06	2.3E+00	2.5E+00	9.1E-01
Selenium	2.7E-05	6.0E-01	4.6E-05	1.3E-01	2.0E-01	6.7E-01
4,4'-DDE	1.1E-06	3.9E-01	2.8E-06	4.0E-03	2.0E-01	2.0E-02
Aroclor-1260	4.4E-04	9.0E+00	4.9E-05	7.4E-01	6.4E+00	1.2E-01
Dieldrin	1.2E-06	6.0E-01	2.1E-06	4.8E-03	6.5E-01	7.5E-03
Di-n-butylphthalate	1.6E-06	1.1E+00	1.5E-06	4.8E-03	1.1E+00	4.3E-03
Fluoranthene	4.1E-06	1.0E+01	4.1E-07	1.3E-02	1.0E+01	1.3E-03
Phenanthrene	2.1E-06	1.0E+01	2.1E-07	6.4E-03	1.0E+01	6.4E-04
Pyrene	4.1E-06	1.0E+01	4.1E-07	1.3E-02	1.0E+01	1.3E-03
Methylene chloride	1.4E-08	5.3E+01	2.7E-10	3.6E-05	5.3E+01	6.8E-07
Tetrachloroethylene	2.4E-09	1.0E+02	2.4E-11	6.2E-06	1.0E+02	6.2E-08
Toluene	8.8E-09	7.6E+01	1.2E-10	2.2E-05	7.6E+01	3.0E-07
Trichlorofluoromethane	1.2E-08	3.5E+01	3.6E-10	3.2E-05	3.5E+01	9.1E-07
4,4'-DDD	3.2E-07	1.4E-01	2.3E-06	1.2E-03	2.0E-01	5.9E-03
4,4'-DDT	1.5E-06	1.4E-01	1.1E-05	4.3E-03	2.0E-01	2.2E-02
2-Methylnaphthylene	7.7E-07	1.0E+01	7.7E-08	2.4E-03	1.0E+01	2.4E-04
Acenaphthylene	5.2E-07	1.0E+01	5.2E-08	1.6E-03	1.0E+01	1.6E-04
Benzo(k)fluoranthene	1.2E-06	1.0E+01	1.2E-07	3.8E-03	1.0E+01	3.8E-04
Chrysene	1.4E-06	1.0E+01	1.4E-07	4.4E-03	1.0E+01	4.4E-04
Naphthalene	6.0E-07	3.6E+01	1.7E-08	1.9E-03	3.6E+01	5.3E-05
1,2-Dichloroethylene (cis and trans)	1.2E-08	3.0E+01	4.0E-10	3.0E-05	3.0E+01	1.0E-06
Acetone	1.2E-07	6.0E+02	1.9E-10	3.0E-04	6.0E+02	4.9E-07
Ethylbenzene	1.0E-08	2.9E+02	3.5E-11	2.6E-05	2.9E+02	8.9E-08
Arsenic	1.1E-04	1.0E+00	1.1E-04	3.0E-01	5.8E-01	5.1E-01
Barium	1.8E-04	2.0E+02	9.3E-07	5.1E-01	2.0E+02	2.6E-03
Manganese .	4.9E-04	4.5E+01	1.1E-05	1.5E+00	4.SE+01	3.3E-02
Zinc	6.6E-03	2.0E+02	3.3E-05	1.0E+01	2.0E+02	5.2E-02
SUMMARY HAZARD INDEX			2.8E-04			2.4F.+00
			10		-	3

PDE = Potential Dietary Exposure (mg/kgBW/day)

RTV = Reference Toxicity Value (mg/kgBW/day)



Risk from Potential Lethal or Sublethal Effects for Terrestrial Receptors from Average Concentrations of CPCs in Food and Surface Soil Table O-2.15

Remedial Investigation Report, AOC 57 Devens, Massachusetts Area 2 Floodplain

ANALYTB	4	White-footed mouse	esnom,		American robin			Raccoon	
	PDE	RTV	HQ	PDE	RTV	НО	PDE	RTV	НО
Antimony	1.2E-02	4.2E+01	2.9E-04	1.5E-02	4.2E+01	3.6E-04	8.1E-06	4.2E+01	1.9E-07
Copper	1.4E+00	1.0E+02	1.4E-02	6.3E-01	1.0E+02	6.3E-03	3.9压-04	1.0E+02	3.9E-06
Lead	6.3E-01	2.5E+00	2.5E-01	1.3E+00	7.5E+01	1.7E-02	6.3E-04	2.5E+00	2.5E-04
Selenium	2.4E-02	2.0E-01	1.2E-01	4.5E-02	6.0E-01	7.5E-02	1.8E-05	2.0E-01	9.0E-05
4,4'-DDE	5.8E-04	2.0E01	2.9E-03	1.0E-03	3.9E-01	2.7E-03	4.0E-07	1.2E+01	3.3E-08
Aroclor -1260	5.4E-02	6.4E+00	8.4E-03	8.7E02	9.0E-01	9.7E-02	4.6E-05	7.5E-03	6.1E-03
Dieldrin	7.1E-04	6.5E-01	1.1E-03	1.3E-03	6.0E-01	2.1E-03	4.8E-07	6.5E-01	7.4E-07
Din-butylphthalate	1.3E-03	1.1E+00	1.2E-03	2.7E-03	1.1E+00	2.4E-03	1.4E-06	1.1E+00	1.3E-06
Fluoranthene	4.9E-03	1.0E+01	4.9E04	5.7E-03	1.0E+01	5.7E-04	3.1E-06	1.0E+01	3.1E-07
Phenanthrene	3.3E-03	1.0E+01	3.3E-04	3.8E-03	1.0E+01	3.8E-04	2.1E-06	1.0E+01	2.1E-07
Pyrene	5.2E-03	1.0E+01	5.2E-04	6.1E-03	1.0E+01	6.1E-04	3.3E-06	1.0E+01	3.3E-07
Methylene Chloride	1.7E-05	5.3E+01	3.2E-07	4.6E-05	5.3E+01	8.7E-07	2.6E-08	5.3E+01	4.9E-10
Tetrachloroethylene	2.2E-06	1.0E+02	2.2E-08	6.0E-06	1.0E+02	6.0E-08	3.4E-09	1.0E+02	3.4E-11
Toluene	4.2E-06	7.6E+01	5.5E-08	1.1E-05	7.6E+01	1.5E-07	6.4E-09	7.6E+01	8.4E-11
Trichlorofluoromethane	1.2E-05	3.5E+01	3.4E-07	3.2E-05	3.5E+01	9.2E-07	1.8E-08	3.5E+01	5.2E-10
4,4'-DDD	3.1E-04	2.0E-01	1.6E-03	5.7E-04	1.4E-01	4.1E-03	2.2E-07	1.2E+01	1.8E-08
4,4'-DDT	4.1E-04	2.0E-01	2.0E-03	7.6E-04	1.4E-01	5.5E-03	3.4E-07	1.2E+01	2.9E-08
2-Methylnaphthalene	1.0E-03	1.0E+01	1.0E-04	1.5E-03	1.0E+01	1.5E-04	8.3E-07	1.0E+01	8.3E-08
Acenaphthylene	7.5E-04	1.0E+01	7.5E-05	1.1E-03	1.0E+01	1.1E-04	6.1E-07	1.0E+01	6.1E-08
Benzo[k]fluoranthene	1.5E-03	1.0E+01	1.5E-04	2.3E03	1.0E+01	2.3E-04	1.3E-06	1.0E+01	1.3E-07
Chrysene	2.2E-03	1.0E+01	2.2E-04	3.4E-03	1.0E+01	3.4E-04	1.8E-06	1.0E+01	1.8E-07
Naphthalene	8.3E-04	3.6E+01	2.3E-05	1.3E-03	3.6E+01	3.5E-05	6.8E-07	3.6E+01	1.9E-08
1,2—Dichloroethylene (cis and trans)	8.8E-06	3.0E+01	2.9E-07	2.4E-05	3.0E+01	8.0E-07	1.4E-08	3.0E+01	4.5E-10
Acetone	7.1E-05	6.0E+02	1.2B-07	1.9E-04	6.0E+02	3.2E-07	1.1E-07	6.0E+02	1.8E-10
Ethylbenzene	7.3E-06	2.9E+02	2.5E-08	2.0E-05	2.9E+02	6.9E-08	1.1E-08	2.9臣+02	3.9E-11
Arsenic	8.4E-01	5.8E-01	1.4E+00	4.4E-01	1.0E+00	4.4E-01	2.6E-04	5.8E-01	4.6E-04
Barium	2.8E-01	2.0E+02	1.4E-03	3.8E-01	2.0E+02	1.9E-03	2.2E-04	2.0E+02	1.1E-06
Manganese	1.2E+00	4.5E+01	2.7E-02	1.3E+00	4.5E+01	3.0E-02	7.5E-04	4.5E+01	1.7E-05
Zinc	5.0E+00	2.0E+02	2.5E-02	3.8E+00	2.0E+02	1.9E-02	2.2E-03	2.0E+02	1.1E-05
SUMMARY HAZARD INDEX			1.9E+00			7.1E-01			6.9E-03
PDE = Potential Dietary Exposure (mg/kgBW/day)		RTV = Reference Toxicity Value (mg/kgBW/day)	Foxicity Value (n	ng/kgBW/day)	Ĥ	2 = Hazard Qu	otient (calculate	HQ = Hazard Quotient (calculated by dividing PDE by RTV)	E by RTV)
in the first a monday of month amount of the state of			·	6	i		,		

Risk from Potential Lethal or Sublethal Effects for Terrestrial Receptors from Average Concentrations of CPCs in Food and Surface Soil Table 0-2.15

Area 2 Floodplain Remedial Investigation Report, AOC 57 Devens, Massachusetts

Antimony RIJY Copper 3.0E-06 4.2E+0 Copper 1.5E-04 1.0B+0 Lead 2.6E-04 7.5E+0 Selenium 4.4°-DDE 7.7E-05 9.0E+0 Arcelor-1260 7.7E-05 9.0E+0 Dieldrin 6.9E-07 3.9E-0 Dieldrin 6.9E-07 1.0E+0 Phenanthrene 8.0E-07 1.0E+0 Phenanthrene 8.0E-07 1.0E+0 Pyrene 8.0E-07 1.0E+0 Methylene Chloride 1.3E-08 5.3E+0 Trichlorofluoromethane 8.0E-07 1.0E+0 Trichlorofluoromethane 2.9E-09 7.6E+0 Trichlorofluoromethane 8.3E-09 7.6E+0 A,4'-DDD 3.2E-07 1.4E-0 A,e-DDD 3.2E-09 1.0E+0 Acconsplittylene 8.3E-07 1.4E-0 Chrysene 1.2-Dichloroethylene (cis and trans) 6.2E-09 3.0E+0 Accone 5.0E-09 2.0B+0 3.0E+0 Accone<	06	HQ			
3.0E-06 1.5E-04 1.2E-05 4.2E-07 7.7E-05 4.9E-07 7.7E-05 6.9E-07 1.2E-08 1.2E-08 1.2E-08 1.2E-08 1.2E-08 2.9E-07 2.9E-07 2.9E-07 7.8E-07			PDE	RTV	HO
1.5E-04 2.6E-04 2.6E-04 1.2E-05 4.2B-07 7.7E-05 4.9E-07 6.9E-07 1.2E-08 8.3E-09 2.3E-07 3.2E-07 3.2E-07 3.2E-07 3.2E-07 3.2E-07 3.2E-07 3.2E-07 3.2E-07 3.2E-07 3.2E-07 3.2E-07 3.2E-07 3.2E-07 3.2E-07 3.3E-0		7.3E-08	1.0E-02	4.2E+01	2.5E-04
c.6E-04 1.2E-05 4.2E-07 7.7E-05 4.9E-07 7.7E-05 4.9E-07 1.2E-06 8.0E-07 1.3E-06 1.2E-08 1.6E-09 1.3E-07 1.3E-0		1.5E-06	2.2E-01	1.0E+02	2.2E-03
e 1.2B-05 4.2B-07 7.7B-05 4.2B-07 6.9B-07 1.2B-06 1.2B-06 1.2B-06 1.2B-08 1.6B-09 1.2B-07 1.3B-06 1.2B-07 1.3B-05 1.3B-05 1.3B-07 1.3B		3.5E-06	1.0E+00	2.5E+00	4.1E-01
4.2B-07 7.7B-05 4.9B-07 6.9B-07 1.2B-06 8.0B-07 1.3B-06 1.2B-08 1.6B-09 2.9B-09 2.9B-09 2.3B-07 3.2B-07 3.2B-07 3.2B-07 3.2B-07 3.2B-07 3.2B-07 5.4B-05 5.2B-09 5.3B-05		2.0E-05	5.8E-02	2.0E-01	2.9E-01
7.7B-05 4.9B-07 6.9B-07 1.2B-06 8.0B-07 1.3B-06 1.2B-08 1.6E-09 2.9B-09 2.9B-09 2.9B-07 3.2B-07 3.2B-07 3.2B-07 3.2B-07 3.2B-07 3.2B-07 3.2B-07 3.3B-0	4.2E-07 3.9E-01	1.1E-06	1.5E-03	2.0E-01	7.7E-03
4.9E-07 6.9E-07 1.2E-06 8.0B-07 1.3E-06 1.2E-08 1.6E-09 2.9B-09 2.3E-07 3.2E-07 3.2E-07 3.2E-07 3.2E-07 3.3E-0	7.7E-05 9.0E+00	8.5E-06	1.3E-01	6.4E+00	2.0E-02
6.9B-07 1.2B-06 8.0B-07 1.3B-06 1.2B-08 1.2B-09 2.9B-09 2.3B-07 3.2B-0	4.9E-07 6.0E-01	8.2E-07	1.9E-03	6.5E-01	3.0E-03
e 8.0E-07 1.2B-06 8.0B-07 1.3B-06 1.2B-08 1.6E-09 2.9B-09 2.3B-07 3.2B	6.9E-07 1.1E+00	6.3E-07	2.0E-03	1.1E+00	1.8E-03
e 8.0E-07 1.3E-06 1.2E-08 1.6E-09 2.9E-09 2.3E-07 3.2E-07 3	1.2E-06 1.0E+01	1.2E-07	3.7E-03	1.0E+01	3.7E-04
e 1.3B-06 1.2B-08 1.2B-08 1.6B-09 2.9B-09 2.3B-07 3.2B-07 3.2B-07 3.5B-07 2.6B-07 7.8B-07 2.9B-07 5.2B-09 5.3B-05 5.3B-05 5.3B-05 5.3B-05 5.3B-05 5.3B-05	8.0E-07 1.0E+01	8.0E-08	2.5E-03	1.0E+01	2.5E-04
e 1.2B-08 1.6B-09 2.9B-09 2.3B-07 3.2B-07 3.2B-07 3.2B-07 3.2B-07 2.6B-07 2.6B-07 2.9B	1.3E-06 1.0E+01	1.3E-07	4.0E-03	1.0E+01	4.0E-04
1.6E-09 2.9E-09 2.3E-07 3.2E-07 3.5E-07 2.6E-07 7.8E-07 7.8E-07 2.9E-07 5.0E-08 5.0E-09 5.3E-09 5.3E-07 2.9E-07 2.9E-07 2.9E-07 2.9E-07 2.9E-07 2.9E-07 2.9E-07 2.9E-07 2.9E-07 2.9E-07 2.9E-07 2.9E-07 2.9E-07 2.9E-07 2.9E-07 2.9E-07 2.9E-07 2.9E-07 2.9E-09 2.2E-09 2.2E-09 2.7E-04	1.2E-08 5.3E+01	2.2E-10	3.0E-05	5.3E+01	5.7E-07
c	1.6E-09 1.0E+02	1.6E-11	4.0E-06	1.0E+02	4.0E-08
e 8.3B-09 2.3B-07 3.2B-07 3.2B-07 3.5B-07 2.6B-07 7.8B-07 7.8B-07 2.9B-07 2.9B-07 5.2B-09 5.2B-09 5.2B-09 5.2B-09 5.2B-09 5.2B-09 5.2B-09 5.2B-09 5.2B-09 5.2B-09 5.2B-09	2.9E-09 7.6E+01	3.9E-11	7.5E-06	7.6E+01	9.9E-08
2.3E-07 3.2B-07 3.2B-07 3.5E-07 2.6B-07 7.8E-07 7.8E-07 2.9E-07 5.0E-09 5.0E-09 5.2B-09 5.2B-09 5.2B-09 5.2B-09 5.2B-09 5.2B-09 5.2B-09 5.2B-09 5.2B-09	8.3E-09 3.5E+01	2.4E-10	2.1E-05	3.5E+01	6.1E-07
3.2B-07 3.5B-07 2.6B-07 5.4B-07 7.8B-07 2.9B-07 2.9B-07 5.0B-08 5.0B-08 5.2B-09 5.2B-09 5.2B-09 5.2B-09 5.2B-09 5.2B-09	2.3E-07 1.4E-01	1.6E-06	8.4E-04	2.0E-01	4.2E-03
3.5E-07 2.6B-07 5.4B-07 7.8E-07 2.9E-07 6.2B-09 5.0E-09 5.2E-09 5.3B-05 8.4B-05 2.7B-04	3.2E-07 1.4E-01	2.3E-06	9.3E-04	2.0E-01	4.7E-03
2.6B-07 thene (cis and trans)	3.5E-07 1.0E+01	3.5E-08	1.1E-03	1.0E+01	1.1E-04
authene 5.4E-07 7.8E-07 2.9E-07 2.0E-09 5.0E-09 5.2E-09 5.3E-05 5.3E-05 2.7E-04	2.6E-07 1.0E+01	2.6E-08	8.1E-04	1.0E+01	8.1E-05
7.8E-07 2.9E-07 2.9E-07 5.0E-09 5.2E-09 5.3E-09 5.3E-05 5.3E-05 5.3E-05	5.4E-07 1.0E+01	5.4E-08	1.7E-03	1.0E+01	1.7E-04
2.9E-07 3 6.2E-09 5.0E-09 5.0E-09 5.2E-09 5.2E-09 5.2E-09 5.3E-05 1 8.4E-05 2.7E-04 4	7.8E-07 1.0E+01	7.8E-08	2.4E-03	1.0E+01	2.4E-04
ethylene (cis and trans) 6.2E-09 3.0E-08 6.2.E-09 6.2E-09 7.2.E-09 7.3.E-05 7.3.E-05 7.2.E-05 7.2.E-04 6.2.E-04	2.9E-07 3.6E+01	8.1E-09	9.0E-04	3.6E+01	2.5E-05
5.0E-08 5.2E-09 5.3E-05 8.4E-05 2.7E-04	6.2E-09 3.0E+01	2.1E-10	1.6E-05	3.0E+01	5.3E-07
5.2B-09 2 5.3B-05 1 8.4B-05 2	5.0E-08 6.0E+02	8.4E-11	1.3E-04	6.0E+02	2.1E-07
. 5.3E-05 1 8.4E-05 2 2.7E-04 4	5.2E-09 2.9E+02	1.8E-11	1.3E-05	2.9E+02	4.5E-08
8.4E-05 2.7E-04	5.3E-05 1.0E+00	5.3E-05	1.5E-01	5.8E-01	2.6E-01
2.7B-04 4	8.4E-05 2.0E+02	4.2E-07	2.3E-01	2.0E+02	1.2E-03
_	2.7E-04 4.5E+01	5.9E-06	8.0E-01	4.5E+01	1.8E-02
Zinc 2.4E-03 2.0E+0	2.4E-03 2.0E+02	1.2E-05	3.8E+00	2.0E+02	1.9E-02
SUMMARY HAZARD INDEX		1.1E-04			1.0E+00
PDE = Potential Dietary Exposure $(mg/kgBW/day)$ RTV = Refer		RTV = Reference Toxicity Value (mg/kgBW/day)	ng/kgBW/day)	H	HQ = Hazard Quotie

Risk from Potential Lethal or Sublethal Effects for Terrestrial Receptors from RME Concentrations of CPCs in Food and Surface Soil Table O-2.16 Area 3

Remedial Investigation Report, AOC 57 Devens, Massachusetts

Arsenic Arsenic <t< th=""><th>+00 +02 +01 +02</th><th>LUL</th><th>Ç</th></t<>	+00 +02 +01 +02	LUL	Ç
m 0.0E+00 2.0E+02 0.0E+00 0.0E		1.9E-05 5.8E-01	3.3E-05
tium 5.4B+00 2.2B+01 2.5B-01 1.3B+00 er 0.0B+00 1.0B+02 0.0B+00 0.0B+00 antese 0.0B+00 2.5B+01 0.0B+00 0.0B+00 DDB 0.0B+00 2.0B+01 9.8B-02 3.3B+00 DDB 1.9B-04 2.0B-01 9.7B-04 2.4B-04 DDT 2.6B-04 2.0B-01 9.7B-04 2.4B-04 or-1242 0.0B+00 0.0B+00 0.0B+00 0.0B+00 or-1260 1.1B-02 6.4B+00 0.0B+00 0.0B+00 or-1260 1.1B-02 6.4B+00 0.0B+00 0.0B+00 or-1260 1.1B-02 6.4B+00 0.0B+00 0.0B+00 0.0B+00 or-1260 1.1B-02 0.0B+00 1.1B-02 0.0B+00 0.0B+00 or-1260 1.1B-02 1.0B+01 1.1B-02 0.0B+00 0.0B+00 or-1260 1.1B-02 1.0B+01 1.1B-02 0.0B+00 0.0B+00 or-1260 1.1B-02 1.0B+01 <		0.0E+00 2.0E+02	0.0E+00
er 0.0B+00 1.0B+02 0.0B+00 0.0		3.4E-04 2.2E+01	1.6E-05
ancese 0.0B+00 2.5B+00 0.0B+00 0.0B+00 DDB 4.4B+00 4.5B+01 9.8B-02 3.3B+00 DDB 1.9B-04 2.0B+01 9.8B-02 3.3B+00 DDT 1.9B-04 2.0B-01 1.3B-03 3.3B-04 DDT 2.6B-04 2.0B-01 1.3B-03 3.3B-04 DDT 0.0B+00 6.4B+00 0.0B+00 0.0B+00 or-1242 0.0B+00 6.4B+00 0.0B+00 0.0B+00 or-1260 1.1B-02 4.4B-02 4.4B-02 anthene 4.0B-04 3.6B+01 1.1B-05 3.1B-04 thalene 9.2B-04 1.0B+01 1.2B-02 7.1B-04 unthrene 9.2B-04 1.0B+01 1.1B-05 3.1B-04 chloroethylene 1.3B-03 1.0B+01 1.3B-04 9.7B-04 im 0.0B+00 1.0B+01 1.0B-05 7.1B-05 1.4B-02 im 0.0D 0.0B+00 1.0B+01 1.0B-02 1.0B-02 im		0.0E+00 1.0E+02	0.0E+00
DDB 4,4B+00 4,5B+01 9,8B-02 3,3B+00 DDB 1,9B-04 2,0B+02 0,0B+00 0,0B+00 DDT 1,9B-04 2,0B-01 9,7B-04 2,4B-04 DDT 2,6B-04 2,0B-01 1,3B-04 2,4B-04 Or-1242 0,0B+00 6,4B+00 0,0B+00 0,0B+00 or-1260 4,1B-02 6,4B+00 0,0B+00 0,0B+00 or-1260 1,1B-02 4,4B-02 4,4B-02 thalene 4,0B-04 3,6B+01 1,1B-05 3,1B-04 thalene 9,2B-04 1,0B+01 1,1B-05 3,1B-04 thalene 9,2B-04 1,0B+01 1,1B-05 3,1B-04 chloroethylene 1,3B-03 1,0B+01 1,1B-05 3,1B-04 chloroethylene 1,3B-03 1,0B+01 1,0B-05 1,1B-05 1,1B-04 chloroethylene 1,3B-03 1,0B-01 1,0B-05 1,1B-05 1,1B-05 chloroethylene 1,3B-03 1,0B-01 1,0B-05 1,0B-05	7.5E+01 0.0E+00	0.0E+00 2.5E+00	0.0E+00
DDB 0.0B+00 2.0B+02 0.0B+00 0.0B+00 DDD 1.9B-04 2.0B-01 9.7B-04 2.4B-04 DDT 2.6B-04 2.0B-01 1.3B-03 3.3B-04 or-1242 0.0B+00 6.4B+00 0.0B+00 0.0B+00 or-1243 0.0B+00 6.4B+00 0.0B+00 0.0B+00 or-1240 4.1B-02 6.4B+00 0.0B+00 0.0B+00 or-1240 4.1B-02 6.4B+00 0.0B+00 0.0B+00 authene 4.1B-02 6.4B+00 6.4B-02 3.1B-04 unthrene 1.2B-03 1.0B+01 1.2B-02 7.1B-04 ch 0.0B+00 1.0B+01 1.2B-02 7.1B-04 ch 0.0B+00 1.0B+01 1.0B+02 7.1B-04 sim 1.2B-02 1.0B+01 1.0B+02 7.2B-02 ch 0.0B+00 1.0B+01 4.0B-05 7.2B-02 im 0.0D 0.0B+00 1.0B+02 2.1B-02 orlordordane 0.0B+00	4.5E+01 7.3E-02	1.3E-04 4.5E+01	2.9E-06
42 20E-01 9.7E-04 24E-04 26B-04 20E-01 1.3E-03 3.3E-04 260 0.0E+00 0.0E+00 0.0E+00 0.0E+00 260 4.1E-02 6.4E+00 0.0E+00 0.0E+00 260 4.1E-02 6.4E+00 0.0E+00 0.0E+00 260 1.2E-03 1.0E+01 1.2E-04 9.0E-04 3ne 4.0E-04 3.6E+01 1.1E-02 9.0E-04 3ne 1.2E-04 1.0E+01 1.2E-04 9.0E-04 3ne 1.3E-04 1.0E+01 1.3E-04 9.0E-04 3ne 1.3E-04 1.0E+01 1.3E-04 9.7E-04 9.7E-04 3ne 1.3E-02 1.0E+01 1.0E-05 1.3E-05 1.3E-05 3ne 1.0E+01 1.0E-01 2.0E-02 1.0E-05 1.0E-05 3ne 1.0E+02 1.0E+01 1.0E-05 1.0E-05 1.0E-05 3ne 1.0E+02 1.0E+02 2.0E-01 1.0E-05 1.0E-05	2.0E+02 0.0E+00	0.0E+00 2.0E+02	0.0E+00
242 2.6B-04 2.0B-01 1.3B-03 3.3B-04 260 0.0B+00 6.4B+00 0.0B+00 0.0B+00 260 4.1B-02 6.4B+00 0.0B+00 0.0B+00 260 4.1B-02 6.4B+00 0.0B+00 9.0B-04 1.2B-03 1.0B+01 1.2B-04 9.0B-04 sine 1.3B-04 1.0B+01 1.1B-05 3.1B-04 sine 1.3B-03 1.0B+01 1.3B-04 9.7B-04 1.1B-04 sine 1.3B-03 1.0B+01 1.3B-04 9.7B-04 1.3B-04 octhylene 0.0B+00 1.0B+01 1.3B-04 9.7B-04 1.3B-04 1.2B-02 1.2B-02 1.0B+01 1.0B-01 1.3B-05 1.3B-05 1.2B-03 1.2B-02 2.0B-01 1.0B-05 1.3B-05 1.3B-05 1.2B-04 1.0B+01 1.0B+01 1.0B-05 1.4B-02 1.4B-02 ordence 2.0B-02 2.0B-01 1.0B-05 1.4B-02 1.4B-02 sxbenzene <	3.9E-01 6.1E-04	2.7E-08 1.2E+01	2.2E-09
12421260012600126001260012600126001260012600 -	1.4E-01 2.3E-03	3.4E-08 1.2E+01	2.8E-09
1260 4.1B-02 6.4B+00 6.4B-03 4.4B-02 5.4B-02 5.4B-02 5.4B-02 5.4B-02 5.4B-02 5.4B-02 5.4B-02 5.4B-02 5.4B-02 5.4B-02 5.4B-02 5.4B-02 5.4B-02 5.4B-02 5.4B-04 5.4B-02 6.4B-02 6.4B-02 6.4B-02 7.4B-03 7.4B-03 7.4B-03 7.4B-03 7.4B-03 7.4B-03 7.4B-03 <th< td=""><td>9.0E-01 0.0E+00</td><td>0.0E+00 7.5E-03</td><td>0.0E+00</td></th<>	9.0E-01 0.0E+00	0.0E+00 7.5E-03	0.0E+00
uthene 1.2B-03 1.0B+01 1.2B-04 9.0B-04 alene 4.0B-04 3.6B+01 1.1B-05 3.1B-04 threne 4.0B-04 3.6B+01 1.1B-05 3.1B-04 intrene 9.2B-04 1.0B+01 9.2B-05 7.1B-04 incochylene 0.0B+00 1.0B+01 1.3B-04 9.7B-04 e 7.3B-06 7.6B-02 9.7B-05 7.1B-04 m 2.0B-02 2.0B-02 1.0B-01 2.5B-02 DD 1.2B-02 2.0B-01 1.0B-01 2.5B-02 Chlordane 6.4B-05 1.6B+01 4.0B-06 7.9B-05 chlorobenzene 6.4B-05 1.6B+01 4.0B-06 7.9B-05 chlorobenzene 5.3B-03 7.6B+02 5.1B-06 3.4B-03 chlorobenzene 6.0B+00 3.5B+01 0.0B+00 0.0B+00 chlorobenzene 0.0B+00 3.5B+01 0.0B+00 0.0B+00 chlorobenzene 0.0B+00 3.5B+01 3.3B-07 5.4B-05	9.0E-01 4.9E-02	7.7E-06 7.5E-03	1.0E-03
alene threate	1.0E+01 9.0E-05	4.3E-08 1.0E+01	4.3E-09
threne 1.0E+01 9.2E-04 7.1E-04 1.0E+01 9.2E-05 7.1E-04 1.3E-04 1.0E+01 1.3E-04 0.0E+00	3.6E+01 8.7E-06	1.5E-08 3.6E+01	4.1E-10
1.3B-03 1.0B+01 1.3B-04 9.7B-04 1.00000000000000000000000000000000000	1.0E+01 7.1E-05	3.4E-08 1.0E+01	3.4E-09
e 0.0B+00 1.0B+02 0.0B+00 0.0B+00 e 7.3B-06 7.6B-02 9.7B-05 1.3B-05 m 2.0B-02 2.0B-01 1.0B-01 2.5B-02 1.3B-05 DD 1.2B-02 2.0B-01 5.9B-02 1.4B-02 1.4B-02 DD 6.4B-05 1.6B+01 4.0B-06 7.9B-05 2.5B-05 Chlordane 6.4B-05 1.6B+01 4.0B-06 7.9B-05 2.5B-05 chlcrobenzene 6.4B-05 1.6B+01 4.0B-06 7.9B-05 2.5B-03 chlcrobenzene 5.3B-03 7.6B+02 5.1B-06 2.5B-03 7.6B+02 chlcrobenzene 5.3B-03 7.6B+02 6.9B-06 3.4B-03 7.6B+03 chlcrobenzene 0.0B+00 3.5B+01 0.0B+00 0.0B+00 0.0B+00 Trichlor oethane 0.0B+00 3.5B+01 3.3B-07 5.4B-05 8.0B+01 Demzene 1.0B-05 4.8B+02 2.1B-08 1.9B-05 Lobelog 1.5B-05 1.5B-05	1.0E+01 9.7E-05	4.6E-08 1.0E+01	4.6E-09
e 6.4B-05	1.0E+02 0.0E+00	0.0E+00 1.0E+02	0.0E+00
e. 6.4E-02 2.0E-01 1.0E-01 2.5E-02 1.2E-02 1.2E-02 2.0E-01 5.9E-02 1.4E-02 1.2E-02 2.0E-01 5.9E-02 1.4E-02 1.2E-02 1.6E+01 4.0E-06 7.9E-05 1.6E+01 4.0E-06 7.9E-05 1.6E+01 4.0E-06 7.9E-05 1.8E-03 7.6E+02 5.1E-06 2.5E-03 7.6E+02 6.9E-06 1.2E-03 7.6E+02 0.0E+00 1.5E+03 0.0E+00 1.5E+00 0.0E+00 1.5E+00 0.0	7.6E-02 1.8E-04	5.3E-10 7.6E-02	7.0E-09
e 6.4B-05 1.0B+01 5.9B-02 1.4B-02 6.4B-05 1.0B+01 4.0B-06 7.9B-05 6.4B-05 1.6B+01 4.0B-06 7.9B-05 6.4B-05 1.6B+01 4.0B-06 7.9B-05 6.4B-05 1.6B+01 4.0B-06 7.9B-05 6.4B-05 1.8B-03 7.6B+02 6.9B-06 3.4B-03 7.6B+02 0.0B+00 0.0B+00 0.0B+00 0.0B+00 0.0B+00 0.0B+00 0.0B+00 0.0B+00 0.0B+01 0.0B	6.0E-01 4.2E-02	2.2E-06 2.0E-01	1.1E-05
e 6.4E-05 1.6E+01 4.0E-06 7.9E-05 3.8E-05 1.6E+01 4.0E-06 7.9E-05 3.8E-03 7.6E+02 5.1E-06 7.9E-05 3.8E-03 7.6E+02 6.9E-06 3.4E-03 7.6E+02 6.9E-06 3.4E-03 7.0E+00 0.0E+00 0.0E+00 1.5E+03 0.0E+00 1.5E+03 0.0E+00 1.5E+03 0.0E+00 1.5E+03 0.0E+00 1.5E+03 0.0E+00 1.0E+00 1.0E+00 1.0E-05 4.8E+02 2.1E-08 1.9E-05 4.8E+02 2.1E-08 1.9E-05	1.4E-01 1.0E-01	1.7E-06 1.2E+01	1.4E-07
e 6.4E-05 1.6E+01 4.0E-06 7.9E-05 3.8E-03 7.6E+02 5.1E-06 2.5E-03 7.6E+02 5.1E-06 3.4E-03 7.6E+02 6.9E-06 3.4E-03 7.6E+01 0.0E+00 0.0E+00 3.5E+01 0.0E+00 0.0E+00 1.5E+03 0.0E+00 1.5E+03 0.0E+00 1.5E+03 0.0E+00 1.5E+03 0.0E+00 1.0E+00 1.0E-05 4.8E+02 2.1E-08 1.9E-05 4.8E+02 2.1E-08 4.8E+02 2.1E-08 4.8E+02 4.8E	3.1E-02 2.6E-03	7.4E-09 1.6E+01	4.6E-10
te 3.8E-03 7.6E+02 5.1E-06 2.5E-03 te 5.3E-03 7.6E+02 5.9E-06 3.4E-03 tuthalate 0.0E+00 3.5E+01 0.0E+00 0.0E+00 ne 0.0E+00 1.5E+03 0.0E+00 0.0E+00 2.9E-05 8.9E+01 3.3E-07 5.4E-05 1.0E-05 4.8E+02 2.1E-08 1.9E-05	3.1E-02 2.6E-03	7.4E-09 1.6E+01	4.6E-10
5.3E-03 7.6E+02 6.9E-06 3.4E-03 7 0.0E+00 3.5E+01 0.0E+00 0.0E+00 3 0.0E+00 1.5E+03 0.0E+00 0.0E+00 3 2.9E-05 8.9E+01 3.3E-07 5.4E-05 8 1.0E-05 4.8E+02 2.1E-08 1.9E-05 4	7.6E+02 3.3E-06	1.2E-07 7.6E+02	1.5E-10
0.0E+00 3.5E+01 0.0E+00 0.0E+00 0.0E+00 1.5E+03 0.0E+00 0.0E+00 2.9E-05 8.9E+01 3.3E-07 5.4E-05 1.0E-05 4.8E+02 2.1E-08 1.9E-05	7.6E+02 4.5E-06	1.6E-07 7.6E+02	2.1E-10
0.0E+00 1.5E+03 0.0E+00 0.0E+00 1.0E+00 2.9E-05 8.9E+01 3.3E-07 5.4E-05 8.7E+02 1.0E-05 4.8E+02 2.1E-08 1.9E-05 4.9E-05	3.5E+01 0.0E+00	0.0E+00 3.5E+01	0.0E+00
2.9E-05 8.9E+01 3.3E-07 5.4E-05 1.0E-05 4.8E+02 2.1E-08 1.9E-05	1.5E+03 0.0E+00	0.0E+00 1.5E+03	0.0E+00
1.0E-05 4.8E+02 2.1E-08 1.9E05	8.9E+01 6.0E-07	2.1E-09 8.9E+01	2.4B-11
	4.8E+02 3.9E-08	7.5E-10 4.8E+02	1.6E-12
Xylenes 0.0E+00 5.0E+02 0.0E+00 0.0E+00 5.0E+0	5.0E+02 0.0E+00	0.0E+00 5.0E+02	0.0E+00
		•	
SUMMARY HAZARD INDEX 3.0E+00	9.1E-01		1.1E-03

Table O-2.16 Risk from Potential Lethal or Sublethal Effects for Terrestrial Receptors from RME Concentrations of CPCs in Food and Surface Soil Area 3

Remedial Investigation Report, AOC 57

Devens, Massachusetts

	C		
Analite .	PDE	<i>balreu uwi</i> RTV	НО
Arsenic	7.0E-05	1.0E+00	7.0E-05
Barium	0.0E+00	2.0E+02	0.0E+00
Cadmium	1.8E-03	1.0E+01	1.8E-04
Copper	0.0E+00	1.0E+02	0.0E+00
Lead	0.0E+00	7.5E+01	0.0E+00
Manganese	6.6E-04	4.5E+01	1.5E-05
Zinc	0.0E+00	2.0E+02	0.0E+00
4,4'-DDE	1.4E-07	3.9E-01	3.7E-07
4,4'-DDT	2.1E-07	1.4E-01	1.5E-06
Aroclor – 1242	0.0E+00	9.0E+00	0.0E+00
Aroclor 1260	2.8E-05	9.0E+00	3.1E-06
Fluoranthene	2.1E-07	1.0E+01	2.1E-08
Naphthalene	7.2E-08	3.6E+01	2.0E-09
Phenanthrene	1.7E-07	1.0E+01	1.7E-08
Pyrene	2.3E-07	1.0E+01	2.3E-08
Tetrachloroethylene	0.0E+00	1.0E+02	0.0E+00
Toluene	3.5E-09	7.6E-02	4.6E-08
Selenium	6.7E-06	6.0E-01	1.1E-05
4,4'-DDD	8.5E-06	1.4E-01	6.1E-05
alphaChlordane	3.0E-08	3.1E-02	9.7E-07
gamma – Chlordane	3.0E-08	3.1E-02	9.7E-07
1,2-Dichlorobenzene	5.5E-07	7.6E+02	7.3E-10
1,4-Dichlorobenzene	7.6E-07	7.6E+02	1.0E-09
Bis(2-ethylhexyl)phthalate	0.0E+00	3.5E+01	0.0E+00
1,1,1-Trichlor oethane	0.0E+00	1.5E+03	0.0E+00
Chlorobenzene	1.4E-08	8.9E+01	1.6E-10
Trichloroethylene	4.9E-09	4.8E+02	1.0E-11
Xylenes	0.0E+00	5.0E+02	0.0E+00
• •••			
SUMMARY HAZARD INDEX	5		3.4E-04

PDE = Potential Dietary Exposure (mg/kgBW/day) SUMMARY HAZARD INDEX

RTV = Reference Toxicity Value (mg/kgBW/day)



Table O-2.17

Risk from Potential Lethal or Sublethal Effects for Terrestrial Receptors from Average Exposure Concentrations of CPCs in Food and Surface Soil Area 3

Remedial Investigation Report, AOC 57 Devens, Massachusetts

ANALYTE	N acra	White-footed mouse	esnom p	A	American robin	nia	R	Red fox	CI
Arsenic	8.7E01	5.8E-01	1.5E+00	3.0E-01	1.0E+00	3.0E-01	1.1B-05	5.8E-01	2.0E-05
Barium	0.0E+00	2.0E+02	0.0E+00	0.0E+00	2.0E+02	0.0E+00	0.0E+00	2.0E+02	0.0E+00
Cachnium	3.3E+00	2.2E+01	1.5E-01	8.0E-01	1.0E+01	8.0E-02	2.1E-04	2.2E+01	9.9E-06
Copper	0.0E+00	1.0E+02	0.0E+00	0.0E+00	1.0E+02	0.0E+00	0.0E+00	1.0E+02	0.0E+00
Lead .	0.0E+00	2.5E+00	0.0E+00	0.0E+00	7.5E+01	0.0E+00	0.0E+00	2.5E+00	0.0E+00
Manganese	1.8E - 02	4.5E+01	3.9E-04	1.3E-02	4.5E+01	2.9E-04	5.2E-07	4.5E+01	1.1E-08
Zinc	0.0E+00	2.0E+02	0.0E+00	0.0E+00	2.0E+02	0.0E+00	0.0E+00	2.0E+02	0.0E+00
4,4'-DDE	1.9E-04	2.0E-01	9.7E-04	2.4E-04	3.9E-01	6.1E-04	2.7E-08	1.2E+01	2.2E-09
4,4'-DDT	1.5E-04	2.0E-01	7.3E-04	1.8E-04	1.4E-01	1.3E-03	1.9E-08	1.2E+01	1.6E-09
Aroclor-1242	0.0E+00	6.4E+00	0.0E+00	0.0E+00	9.0E-01	0.0E+00	0.0E+00	7.5E-03	0.0E+00
Aroclor-1260	1.0E-02	6.4E+00	1.6E-03	1.1E-02	9.0E-01	1.3E-02	2.0E-06	7.5E-03	2.6E-04
Fluoranthene	1.2E-03	1.0E+01	1.2E-04	9.0E-04	1.0E+01	9.0E-05	4.3E-08	1.0E+01	4.3E-09
Naphthalene	4.0E-04	3.6E+01	1.1E-05	3.1E-04	3.6E+01	8.7E-06	1.5E08	3.6E+01	4.1E-10
Phenanthrene	9.2E-04	1.0E+01	9.2E-05	7.1E-04	1.0E+01	7.1E-05	3.4E-08	1.0E+01	3.4E-09
Pyrene	1.3E-03	1.0E+01	1.3E-04	9.7E-04	1.0E+01	9.7E-05	4.6E-08	1.0E+01	4.6E-09
Tetrachloroethylene	0.0E+00	1.0E+02	0.0E+00	0.0E+00	1.0E+02	0.0E+00	0.0E+00	1.0E+02	0.0E+00
Toluene	3.4E-06	7.6E-02	4.5E-05	6.3E-06	7.6E-02	8.2E-05	2.5E-10	7.6E-02	3.3E-09
Selenium	6.1E-03	2.0E-01	3.1E-02	7.6E-03	6.0E-01	1.3E-02	6.6E-07	2.0E-01	3.3E-06
4,4'-DDD	2.7E-03	2.0E-01	1.3E-02	3.3E-03	1.4E-01	2.3E-02	3.8E-07	1.2E+01	3.2E-08
alpha—Chlordane	4.7E-05	1.6E+01	3.0E-06	5.9E-05	3.1E-02	1.9E-03	5.5E-09	1.6E+01	3.5E-10
gamma – Chlordane	4.7E-05	1.6E+01	3.0E-06	5.9E-05	3.1E-01	1.9E-04	5.5E-09	1.6E+01	3.5E-10
1,2-Dichlorobenzene	1.4E-03	7.6E+02	1.9E-06	9.1E-04	7.6E+02	1.2E-06	4.2E-08	7.6E+02	5.6E-11
1,4-Dichlorobenzene	1.7E-03	7.6E+02	2.3E-06	1.1E-03	7.6E+02	1.5E-06	5.2E-08	7.6E+02	6.8E-11
Chlorobenzene	8.1E-06	8.9E+01	9.1E-08	1.5E-05	8.9E+01	1.7E-07	5.9E-10	8.9E+01	6.6E-12
Trichloroethylene	5.1E-06	4.8E+02	1.1E-08	9.4E-06	4.8E+02	2.0E-08	3.7E-10	4.8E+02	7.8E-13
		•							
SUMMARY HAZARD INDEX			1.7E+00			4.4E-01			3.0E-04
DDE - Dotantial Distant Ernosure (malbaBW/day)		DTX - Deference Towinity Volue (mallraD) 1/dow	Towicity Wolne	(ved)/II/dozi))n	Transfer	U - Horney Onetient (molanisted by dividing DI)	TO DESCRIPTION DIDE	F. D.T.

PDE = Potential Dietary Exposure (mg/kgBW/day)

RTV = Reference Toxicity Value (mg/kgBW/day)

Table O-2.17

Risk from Potential Lethal or Sublethal Effects for Terrestrial Receptors from Average Exposure Concentrations of CPCs in Food and Surface Soil Area 3

Remedial Investigation Report, AOC 57 Devens, Massachusetts

ANALYTE	B	Barredowl	
•	PDE	RIV	HQ
Arsenic	4.2E-05	1.0E+00	4.2E-05
Barium	0.0E+00	2.0E+02	0.0E+00
Cadmium	1.1E-03	1.0E+01	1.1E-04
Copper	0.0E+00	1.0E+02	0.0E+00
Lead	0.0E+00	7.5E+01	0.0E+00
Manganese	2.6E-06	4.5E+01	5.9E-08
Zinc	0.0E+00	2.0E+02	0.0E+00
4,4"-DDE	1.4E-07	3.9E-01	3.7E-07
4,4'-DDT	1.2E-07	1.4E-01	8.3E-07
Aroclor – 1242	0.0E+00	9.0E+00	0.0E+00
Aroclor-1260	7.1E-06	9.0E+00	7.9E-07
Fluoranthene	2.1E-07	1.0E+01	2.1E-08
Naphthalene	7.2E-08	3.6E+01	2.0E-09
Phenanthrene	1.7E-07	1.0E+01	1.7E-08
Pyrene	2.3E-07	1.0E+01	2.3E-08
Tetrachloroethylene	0.0E+00	1.0E+02	0.0E+00
Toluene	1.6E-09	7.6E-02	2.1E-08
Selenium	2.0E-06	6.0E-01	3.3E-06
4,4'-DDD	1.9E-06	1.4E-01	1.4E-05
alpha Chlordane	2.2E-08	3.1E-02	7.2E-07
gamma Chlordane	2.2E-08	3.1E-02	7.2E-07
1,2-Dichlorobenzene	2.0E-07	7.6E+02	2.7E-10
1,4-Dichlorobenzene	2.5E-07	7.6E+02	3.2E-10
Chlorobenzene	3.8E-09	8.9E+01	4.3E-11
Trichloroethylene	2.4E-09	4.8E+02	5.1E-12

SUMMARY HAZARD INDEX
PDE = Potential Dietary Exposure (mg/kgBW/day)

RTV = Reference Toxicity Value (mg/kgBW/day)



Table O-2.18
Risk from Lethal or Sublethal Effects for Semi-Aquatic Receptors from RME Exposure Concentrations of CPCs in Food, Unfiltered Surface Water, and Sediment Area 2

Remedial Investigation Report, AOC 57 Devens, Massachusetts

CHEMICAL	M	Muskrat	On.	M Erre	Mallard	CH.	Renne	<i>Вассооп</i>	Ş
Aluminum	1.2E+02	4.3E+02	2.8E-01	7.2E-02	4.3E+02	1.7E-04	2.5E-01	4.3E+02	5.8E-04
Arsenic	5.0E+00	5.8E-01	8.6E+00	1.1E-02	1.0E+00	1.1E-02	2.1E-03	5.8E-01	3.6E-03
Barium	1.3E+00	2.0E+02	6.7E-03	1.3E-03	2.0E+02	6.4E-06	1.6E-03	2.0E+02	8.0E-06
Cachnium	5.4E-02	2.2E+01	2.5E-03	1.7E-05	1.0E+01	1.7E-06	7.0E-04	2.2E+01	3.3E-05
Chromium	3.9E-01	3.5E+00	1.1E-01	2.3E-04	2.5E+01	9.1E-06	1.1E-03	3.5E+00	3.2E-04
Cobalt	3.5E-01	4.2E+00	8.4E-02	1.7E-04	4.2E+00	4.0E-05	2.5E-03	4.2E+00	6.0E-04
Copper	2.8E+00	1.0E+02	2.8E-02	2.9E-03	1.0E+02	2.9E-05	1.3E-02	1.0E+02	1.3E-04
Lead	4.2E+00	2.5E+00	1.7E+00	5.3E-03	7.5E+01	7.0E-05	6.6E-03	2.5E+00	2.6E-03
Manganese	5.8E+01	4.5E+01	1.3E+00	9.7E-02	4.5E+01	2.1E-03	9.9E-02	4.5E+01	2.2E-03
Mercury	1.1E-01	9.0E-01	1.2E-01	4.0E-05	6.4E-02	6.3E-04	1.4E-03	1.0E-01	1.4E-02
Nickel	3.8E-01	1.3E+01	2.9E-02	2.5E-04	5.0E+01	5.1E-06	1.3E-03	1.3E+01	9.6E-05
Selenium	1.6E-01	2.0E-01	7.8E-01	2.3E-04	1.8E+00	1.3E-04	5.9E-04	2.0E-01	2.9E-03
Vanadium	6.8E-03	6.0E+00	1.1E-03	1.2E-05	1.1E+01	1.1E-06	1.1E-05	6.0E+00	1.9E-06
Zinc	3.2E+01	2.0E+02	1.6E-01	7.2E-02	2.0E+02	3.6E-04	7.9E-02	2.0E+02	3.9E-04
4,4'-DDD	3.1E-03	2.0B-01	1.6E-02	2.2E-06	1.2E+00	1.9E-06	3.9E-06	1.2E+01	3.2E-07
4,4'-DDE	1.2E-03	2.0E-01	5.8E-03	8.0E-07	5.8E-01	1.4E-06	1.8E-06	1.2E+01	1.5E-07
4,4'-DDT	1.6E-03	2.0E-01	8.0E-03	6.4E-07	1.2E+00	5.5E-07	1.5E-05	1.2E+01	1.2E-06
Aroclor-1260	3.9E-03	6.4E+00	6.1E-04	6.8E-06	9.0E-01	7.5E-06	9.1E-06	7.5E-03	1.2E-03
Dieldrin	3.5E-04	6.5E-01	5.3E-04	2.8E-07	2.2E+00	1.3E-07	4.0E-07	6.5E-01	6.2E-07
Benzo[k]fluoranthene	2.9E-02	1.0E + 01	2.9E-03	3.4E-05	1.0E+01	3.4E-06	4.0E-05	1.0E+01	4.0E-06
Bis(2-ethylhexyl)phthalate	5.1E-02	3.5E+01	1.5E-03	1.6E-05	3.5E+01	4.7E-07	6.6E-04	3.5E+01	1.9E-05
Fluoranthene	5.7E-02	1.0E+01	5.7E-03	6.8E-05	1.0E+01	6.8E-06	7.9E-05	1.0E+01	7.9E-06
Phenanthrene	2.9E-02	1.0E+01	2.9E-03	3.4E-05	1.0E+01	3.4E-06	4.1E-05	1.0E+01	4.1E-06
Pyrene	5.7E-02	1.0E+01	5.7E-03	6.8E-05	1.0E+01	6.8E-06	7.9E-05	1.0E+01	7.9E-06
1,2-Dichloroethylenes (cis and trans)	2.5E-03	3.0E+01	8.2E-05	4.4E-06	3.0E+01	1.5E-07	4.1E-06	3.0E+01	1.4E-07
Acetone	2.1E-03	6.0E+02	3.4E-06	1.0E-06	6.0E+02	1.7E-09	2.7E-06	6.0E+02	4.5E-09
Methylene chloride	1.4E-03	5.3臣+01	2.6E-05	1.2E-06	5.3E+01	2.3E-08	2.0E-06	5.3E+01	3.7E-08
Tetrachioroethylene	6.9E-04	1.0E+02	6.9E-06	5.6E-07	1.0E+02	5.6E-09	9.7E-07	1.0E+02	9.7E-09
Toluene	2.4E-04	7.6E+01	3.1E-06	2.5E-07	7.6E+01	3.3E-09	3.5E-07	7.6E+01	4.6E-09
Trichlorofluoromethane	5.0E04	3.5E+01	1.4E-05	2.5E-07	3.5E+01	7.2E-09	6.7E-07	3.5E+01	1.9E-08

A2SWSDUM.wk1

Table O-2.18
Risk from Lethal or Sublethal Effects for Semi-Aquatic Receptors from RME Exposure Concentrations of CPCs in Food, Unfiltered Surface Water, and Sediment Area 2

Remedial Investigation Report, AOC 57 Devens, Massachusetts

CHEMICAL		Muskrat			Mallard			Raccoon	
	PDE	RIV	HQ	PDE	RTV	НО	PDE	RTV	HQ
1,2-Dichlorobenzene	0.0E+00	7.6E+02	0.0E+00	0.0E+00	7.6E+02	0.0E+00	0.0E+00	7.6E+02	0.0E+00
1,4-Dichlorobenzene	0.0E+00	7.6E+02	0.0E+00	0.0E+00	7.6E+02	0.0E+00	0.0E+00	7.6E+02	0.0E+00
Benzo(b)fluoranthene	0.0E+00	1.0E+01	0.0E+00	0.0E+00	1.0E+01	0.0E+00	0.0E+00	1.0E+01	0.0E+00
Chrysene .	9.9E-03	1.0E+01	9.9E-04	4.1E-06	1.0E+01	4.1E-07	1.6E-05	1.0E+01	1.6E-06
Naphthalene	0.0E+00	3.6E+01	0.0E+00	0.0E+00	3.6E+01	0.0E+00	0.0E+00	3.6E+01	0.0E+00
Benzene	0.0E+00	7.6E+02	0.0E+00	0.0E+00	7.6E+02	0.0E+00	0.0E+00	7.6E+02	0.0E+00
Carbon disulfide	1.0E~04	1.1E+01	9.4E-06	1.8E-07	1.1E+01	1.7E-08	1.7E-07	1.1E+01	1.6E-08
Chlorobenzene	0.0E+00	8.9E+01	0.0E+00	0.0E+00	8.9E+01	0.0E+00	0.0E+00	8.9E+01	0.0E+00
Chloroform	6.8E-05	1.6E+02	4.1E-07	1.2E-07	1.6E+02	7.4E-10	1.1E-07	1.6E+02	6.9E-10
Trichloroethylene	5.1E-04	4.8E+02	1.1E-06	6.8E-07	4.8E+02	1.4E-09	7.9E-07	4.8E+02	1.6E-09
Xylene	0.0E+00	5.0E+02	0.0E+00	0.0E+00	5.0E+02	0.0E+00	0.0E+00	5.0E+02	0.0E+00
SUMMARY HAZARD INDEX			1.3E+01			1.5E-02			2.8E-02

PDE = Potential Dietary Exposure (mg/kgBW-day).

RTV = Reference Toxicity Value (mg/kgBW-day)

Table O-2.18 Risk from Lethal or Sublethal Effects for Semi-Aquatic Receptors from RME Exposure Concentrations of CPCs in Food, Unfiltered Surface Water, and Sediment Area 2

Remedial Investigation Report, AOC 57 Devens, Massachusetts

CHEMICAL	B	Great blue heron	ינסח
	PDE	RTV	HQ
Aluminum	6.3E+01	4.3E+02	1.5E-01
Arsenic	2.5E-01	1.0E+00	2.5E-01
Barium	1.9E-01	2.0E+02	9.5E-04
Cadmium	3.2E-01	1.0E+01	3.2E-02
Chromium	3.6E-01	2.5E+01	1.4E-02
Cobalt	1.1E+00	4.2E+00	2.6E-01
Copper	5.4E+00	1.0E+02	5.4E-02
Lead	1.7E+00	7.5E+01	2.2E-02
Manganese	3.3E+01	4.5E+01	7.3E-01
Mercury	6.3E-01	6.4E-02	9.8E+00
Nickel	4.4E-01	5.0E+01	8.8E-03
Selenium	2.5E-01	6.0E-01	4.1E-01
Vanadium ·	7.6E-04	1.1E+01	6.9E-05
Zinc	3.5E+01	2.0E+02	1.8E-01
4,4'-DDD	2.6E-03	1.4E - 01	1.9E-02
4,4'-DDE	2.3E-03	3.9E-01	6.0E-03
4,4'-DDT	6.6E-03	1.4E-01	4.7E-02
Aroclor-1260	6.6E-03	9.0E+00	7.3E-04
Dieldrin	1.3E-04	6.0E - 01	2.1E-04
Benzo[k]fluoranthene	8.7E-03	1.0E + 01	8.7E-04
Bis(2-ethylhexyl)phthalate	3.1E-01	3.5E+01	8.7E-03
Fluoranthene	1.7E-02	1.0E+01	1.7E-03
Phenanthrene	9.5E-03	1.0E+01	9.5E-04
Pyrene	1.7E-02	1.0E+01	1.7E-03
1,2-Dichloroethylenes (cis and trans)	2.7E-04	3.0E+01	9.2E-06
Acetone	2.6E-04	6.0E+02	4.3E~07
Methylene chloride	1.7E-04	5.3E+01	3.2E-06
Tetrachloroethylene	8.4E-05	1.0E + 02	8.4E-07
Toluene	2.8E-05	7.6E+01	3.7E-07
Trichlorofluoromethane	6.4E-05	3.5E+01	1.8E-06

Risk from Lethal or Sublethal Effects for Semi-Aquatic Receptors from RME Exposure Concentrations of CPCs in Food, Unfiltered Surface Water, and Sediment Table 0-2.18 Area 2

Remedial Investigation Report, AOC 57 Devens, Massachusetts

TCAL Great blue heron chlorobenzene 0.0E+00 7.6E+02 chlorobenzene 0.0E+00 7.6E+02 chlorobenzene 0.0E+00 7.6E+02 chlorobenzene 0.0E+00 7.6E+02 ne 0.0E+00 1.0E+01 alene 0.0E+00 3.6E+01 e 0.0E+00 7.6E+02 idisulfide 1.2E-05 1.1E+01 benzene 7.6E-05 4.8B+01 coethylene 6.0E-05 4.8B+02	PDE oberzene onoB+00 cranthene a.5B-03 onoB+00 onoB+00 onoB+00 onoB+00 onoB+00	Great blue heron PDE RTV B 0.08+00 7.68+02 ene 0.08+00 7.68+02 0.08+00 7.68+01 0.08+00 3.68+01 0.08+00 7.68+02 1.28-05 1.18+01 0.08+00 8.98+01 7.68-06 1.68+02 0.08+00 8.98+01	PDE RTV Bene	Great blue heron PDE RTV B 0.0B+00 7.6B+02 ene 0.0B+00 7.6B+02 ene 0.0B+00 7.6B+02 0.0B+00 1.0B+01 0.0B+00 3.6B+01 0.0B+00 7.6B+02 1.2B-05 1.1B+01 0.0B+00 8.9B+01 7.6B-06 1.6B+02 6.0B-05 4.8B+02 0.0B+00 5.0B+02	CHEMICAL 1,2-Dichlorobenzene 1,4-Dichlorobenzene Benzo(b)fluoranthene	8 8 9	reat blue he	eron
ene 0.0B+00 7.6B+02 ene 0.0B+00 7.6B+02 ene 0.0B+00 7.6B+02 0.0B+00 1.0B+01 3.5B-03 1.0B+01 0.0B+00 3.6B+01 0.0B+00 7.6B+02 1.2B-05 1.1B+01 0.0B+00 8.9B+01 7.6B-06 1.6B+02 6.0B-07 4.8B+02	Porobenzene lorobenzene luoranthene sne	ene 0.0E+00 7.6E+02 ene 0.0E+00 7.6E+02 ene 0.0E+00 7.6E+02 0.0E+00 1.0E+01 3.5E-03 1.0E+01 0.0E+00 3.6E+01 0.0E+00 7.6E+02 1.2E-05 1.1E+01 0.0E+00 8.9E+01 7.6E-06 1.6E+02 6.0E-05 4.8E+02	ene 0.0B+00 7.6B+02 ene 0.0B+00 7.6B+02 ene 0.0B+00 7.6B+02 ene 0.0B+00 1.0B+01 3.5B-03 1.0B+01 0.0B+00 7.6B+02 1.2B-05 1.1B+01 0.0B+00 8.9B+01 7.6B-06 1.6B+02 6.0B-05 4.8B+02 0.0B+00 5.0B+02	ene 0.0B+00 7.6B+02 ene 0.0B+00 7.6B+02 ene 0.0B+00 7.6B+02 ene 0.0B+00 1.0B+01 3.5B-03 1.0B+01 0.0B+00 3.6B+01 0.0B+00 7.6B+02 1.2B-05 1.1B+01 0.0B+00 8.9B+01 7.6B-06 1.6B+02 6.0B-05 4.8B+02 0.0B+00 5.0B+02	1,2 – Dichlorobenzene 1,4 – Dichlorobenzene Benzo(b)fluoranthene	PDE 0.0E+00 0.0E+00	7,47	
ene 0.0B+00 7.6B+02 ene 0.0B+00 7.6B+02 ene 0.0B+00 1.0B+01 3.5B-03 1.0B+01 0.0B+00 3.6B+01 0.0B+00 7.6B+02 1.2B-05 1.1B+01 0.0B+00 8.9B+01 7.6B-05 6.0B+02 6.0B-05 4.8B+02	lorobenzene lorobenzene iluoranthene zne	ene 0.0B+00 7.6B+02 ene 0.0B+00 7.6B+02 ene 0.0B+00 1.0B+01 3.5B-03 1.0B+01 0.0B+00 3.6B+01 0.0B+00 7.6B+02 1.2B-05 1.1B+01 0.0B+00 8.9B+01 7.6B-06 1.6B+02 6.0B-05 4.8B+02	ene 0.0B+00 7.6B+02 ene 0.0B+00 7.6B+02 ene 0.0B+00 1.0B+01 3.5B-03 1.0B+01 0.0B+00 3.6B+01 0.0B+00 7.6B+02 1.2B-05 1.1B+01 0.0B+00 8.9B+01 7.6B-06 1.6B+02 6.0B-05 4.8B+02 0.0B+00 5.0B+02	ene 0.0B+00 7.6B+02 ene 0.0B+00 7.6B+02 ene 0.0B+00 1.0B+01 3.5B-03 1.0B+01 0.0B+00 3.6B+01 0.0B+00 7.6B+02 1.2B-05 1.1B+01 0.0B+00 8.9B+01 7.6B-06 1.6B+02 6.0B-05 4.8B+02 0.0B+00 5.0B+02	1,2-Dichlorobenzene 1,4-Dichlorobenzene Benzo(b)fluoranthene	0.0B+00 0.0B+00 0.0B+00	Y14	HO
ene 0.0E+00 7.6E+02 0.0E+00 1.0E+01 3.5E-03 1.0E+01 0.0E+00 3.6E+01 0.0E+00 7.6E+02 1.2E-05 1.1E+01 0.0E+00 8.9E+01 7.6E-06 1.6E+02 6.0E-05 4.8E+02	lorobenzene Juoranthene rne sulfide	ene 0.0E+00 7.6E+02 0.0E+00 1.0E+01 3.5E-03 1.0E+01 0.0E+00 3.6E+01 0.0E+00 7.6E+02 1.2E-05 1.1E+01 0.0E+00 8.9E+01 7.6E-06 1.6E+02 6.0E-05 4.8E+02	ene 0.0E+00 7.6E+02 0.0E+00 1.0E+01 3.5E-03 1.0E+01 0.0E+00 3.6E+01 0.0E+00 7.6E+02 1.2E-05 1.1E+01 0.0E+00 8.9E+01 7.6E-06 1.6E+02 6.0E-05 4.8E+02 0.0E+00 5.0E+02	one one one+00 7.6B+02 one+00 1.0B+01 3.5B-03 1.0B+01 one+00 3.6B+01 one+00 7.6B+02 1.2B-05 1.1B+01 one+00 8.9B+01 7.6B-06 1.6B+02 one+00 8.9B+02 one+00 8.0B+02	1,4-Dichlorobenzene Benzo(b)fluoranthene	0.0E+00	7.6E+02	0.0E+00
0.0E+00 1.0E+01 3.5E-03 1.0E+01 0.0E+00 3.6E+01 0.0E+00 7.6E+02 1.2E-05 1.1E+01 0.0E+00 8.9E+01 7.6E-06 1.6E+02 6.0E-05 4.8E+02	luoranthene sne sulfide	0.0E+00 1.0E+01 3.5E-03 1.0E+01 0.0E+00 3.6E+01 0.0E+00 7.6E+02 1.2E-05 1.1E+01 0.0E+00 8.9E+01 7.6E-06 1.6E+02 6.0E-05 4.8E+02 0.0E+00 5.0E+02	0.0E+00 1.0E+01 3.5E-03 1.0E+01 0.0E+00 3.6E+01 0.0B+00 7.6E+02 1.2E-05 1.1E+01 0.0E+00 8.9E+01 7.6E-06 1.6E+02 6.0E-05 4.8E+02 0.0E+00 5.0E+02	0.0E+00 1.0E+01 3.5E-03 1.0E+01 0.0E+00 3.6E+01 0.0E+00 7.6E+02 1.2E-05 1.1E+01 0.0E+00 8.9E+01 7.6E-06 1.6E+02 6.0E-05 4.8E+02 0.0E+00 5.0E+02	Benzo(b)fluoranthene	0.015+00	7.6E+02	0.0E+00
3.5E-03 1.0E+01 0.0E+00 3.6E+01 0.0B+00 7.6E+02 1.2E-05 1.1E+01 0.0E+00 8.9E+01 7.6E-06 1.6E+02 6.0E-05 4.8E+02	one sulfide	3.5E-03 1.0E+01 0.0E+00 3.6E+01 0.0E+00 7.6E+02 1.2E-05 1.1E+01 0.0E+00 8.9E+01 7.6E-06 1.6E+02 6.0E-05 4.8E+02 0.0E+00 5.0E+02	3.5E-03 1.0E+01 0.0E+00 3.6E+01 0.0E+00 7.6E+02 1.2E-05 1.1E+01 0.0E+00 8.9E+01 7.6E-06 1.6E+02 6.0E-05 4.8E+02 0.0E+00 5.0E+02	3.5B-03 1.0B+01 0.0B+00 3.6B+01 0.0B+00 7.6B+02 1.2B-05 1.1B+01 0.0B+00 8.9B+01 7.6B-06 1.6B+02 6.0B-05 4.8B+02 0.0B+00 5.0B+02		20.0	1.0E+01	0.0E+00
0.0E+00 3.6E+01 0.0B+00 7.6E+02 1.2E-05 1.1E+01 0.0E+00 8.9E+01 7.6E-06 1.6E+02 6.0E-05 4.8E+02		0.0E+00 3.6E+01 0.0E+00 7.6E+02 1.2E-05 1.1E+01 0.0E+00 8.9E+01 7.6E-06 1.6E+02 6.0E-05 4.8E+02 0.0E+00 5.0E+02	0.0E+00 3.6E+01 0.0B+00 7.6E+02 1.2E-05 1.1E+01 0.0E+00 8.9E+01 7.6E-06 1.6E+02 6.0E-05 4.8E+02 0.0E+00 5.0E+02	0.0E+00 3.6E+01 0.0B+00 7.6E+02 1.2E-05 1.1E+01 0.0E+00 8.9E+01 7.6E-06 1.6E+02 6.0E-05 4.8E+02 0.0E+00 5.0E+02	Chrysene	3.5E-03	1.0E + 01	3.5E-04
0.0B+00 7.6B+02 1.2E-05 1.1E+01 0.0E+00 8.9E+01 7.6E-06 1.6E+02 6.0E-05 4.8E+02		0.0B+00 7.6B+02 1.2E-05 1.1B+01 0.0B+00 8.9B+01 7.6B-06 1.6B+02 6.0B-05 4.8B+02 0.0B+00 5.0B+02	0.0B+00 7.6B+02 1.2E-05 1.1B+01 0.0B+00 8.9B+01 7.6B-06 1.6B+02 6.0B-05 4.8B+02 0.0B+00 5.0B+02	0.0B+00 7.6B+02 1.2E-05 1.1E+01 0.0B+00 8.9B+01 7.6E-06 1.6B+02 6.0B-05 4.8B+02 0.0B+00 5.0B+02	Naphthalene	0.0E+00	3.6E+01	0.0E+00
1.2E-05 1.1E+01 0.0E+00 8.9E+01 7.6E-06 1.6E+02 6.0E-05 4.8E+02	_	1.2E-05 1.1E+01 0.0E+00 8.9E+01 7.6E-06 1.6E+02 6.0E-05 4.8E+02 0.0R+00 5.0E+02	1.2E-05 1.1E+01 0.0E+00 8.9E+01 7.6E-06 1.6E+02 6.0E-05 4.8E+02 0.0E+00 5.0E+02	1.2E-05 1.1E+01 0.0E+00 8.9E+01 7.6E-06 1.6E+02 6.0E-05 4.8E+02 0.0E+00 5.0E+02	Benzene	0.0E+00	7.6E+02	0.0E+00
0.0E+00 8.9E+01 7.6E-06 1.6E+02 6.0E-05 4.8E+02		0.0E+00 8.9E+01 7.6E-06 1.6E+02 6.0E-05 4.8E+02 0.0R+00 5.0E+02	0.0E+00 8.9E+01 7.6E-06 1.6E+02 6.0E-05 4.8E+02 0.0E+00 5.0E+02	0.0E+00 8.9E+01 7.6E-06 1.6E+02 6.0E-05 4.8E+02 0.0E+00 5.0E+02	Carbon disulfide	1.2E-05	1.1E+01	1.1E-06
7.6E-06 1.6E+02 6.0E-05 4.8E+02		7.6E-06 1.6E+02 6.0E-05 4.8E+02 0.0R+00 5.0E+02	7.6E-06 1.6E+02 6.0E-05 4.8E+02 0.0E+00 5.0E+02	7.6E-06 1.6E+02 6.0E-05 4.8E+02 0.0E+00 5.0E+02	Chlorobenzene	0.0E+00	8.9E+01	0.0E+00
6.0E-05 4.8E+02		6.0E-05 4.8E+02 0.0E+00 5.0E+02	6.0E-05 4.8E+02 0.0E+00 5.0E+02	6.0E-05 4.8E+02 0.0E+00 5.0E+02	Chloroform	7.6E-06	1.6E+02	4.6E-08
CO LCC		0.0E+00 5.0E+02	0.0E+00 5.0E+02	0.0E+00 5.0E+02	Trichloroethylene	6.0E-05	4.8E+02	1.2E-07
0.05+0.2					Xylene	0.0E+00	5.0E+02	0.0E+00
					oethylene	6.0E-05	4.8H	2 2
0.0E+00					ylene	0.0E+00	5.0E+02	

						-		

SUMMARY HAZARD INDEX
1.2E+01
PDE = Potential Dietary Exposure (mg/kgBW-day).
RTV = Reference Toxicity Value (mg/kgBW-day)

Table O-2.19
Risk from Lethal or Sublethal Effects for Semi-Aquatic Receptors from Average Exposure Concentrations of CPCs in Food, Unfiltered Surface Water, and Sediment Area 2

Remedial Investigation Report, AOC 57 Devens, Massachusetts

CHEMICAL +	M Elad	Muskrat	On	N Eug	Mailard	On.	Re	Вассооп	OH
Aluminum	8.6E+01	4.3E+02	2.0E-01	5.1E-02	4.3E+02	1.2E-04	1.8E-01	4.3E+02	4.2E-04
Arsenic	1.6E+00	5.8E-01	2.7E+00	3.6E-03	1.0E+00	3.6E-03	6.7E-04	5.8E-01	1.1E-03
Barium	5.7E-01	2.0E+02	2.9E-03	5.4E-04	2.0E+02	2.7E-06	6.8E-04	2.0E+02	3.5E-06
Cadmium	1.3E-02	2.2E+01	5.9E-04	4.0E-06	1.0E+01	4.0E-07	1.6E-04	2.2E+01	7.6E-06
Chromium	1.9E-01	3.5E+00	5.3E-02	1.1E-04	2.5E+01	4.3E-06	5.3E-04	3.5E+00	1.5E-04
Cobalt	2.1E-01	4.2E+00	4.9E-02	9.7E-05	4.2E+00	2.3E-05	1.5E-03	4.2E+00	3.5E-04
Copper	6.3E-01	1.0E+02	6.3E-03	6.6E-04	1.0E+02	6.6E-06	2.7E-03	1.0E+02	2.7E-05
Lead	1.8E+00	2.5E+00	7.1E-01	2.2E-03	7.5E+01	2.9E-05	2.8E-03	2.5E+00	1.1E-03
Manganese	1.9E+01	4.5E+01	4.2E-01	3.0E-02	4.5E+01	6.6E-04	4.6E-02	4.5E+01	1.0E-03
Mercury	6.1E-02	9.0E-01	6.7E-02	1.8E-05	6.4E-02	2.8E-04	7.9E-04	1.0E-01	7.9E-03
Nickel	2.6E-01	1.3E+01	2.0E-02	1.7E-04	5.05+01	3.5E-06	8.5E-04	1.3E+01	6.6E-05
Selenium	4.6E-02	2.0E-01	2.3E-01	7.0E-05	1.8E+00	4.0E-05	1.8E-04	2.0E-01	8.8E-04
Vanadium	1.6E-03	6.0E+00	2.6E-04	2.8E-06	1.1E+01	2.5E-07	2.6E-06	6.0E+00	4.3E-07
Zinc	1.4E+01	2.0E+02	6.9E-02	3.2E-02	2.0E+02	1.6E-04	3.5E-02	2.0E+02	1.7E-04
4,4'-DDD	1.1E-03	2.0E-01	5.3E-03	7.2E-07	1.2E+00	6.2E-07	1.3E-06	1.2E+01	1.1E-07
4,4'-DDE	4.0E-04	2.0E-01	2.0E-03	2.8E-07	5.8E-01	4.8E-07	8.6E-07	1.2E+01	7.2E-08
4,4'-DDT	8.4E-04	2.0E-01	4.2E-03	3.3E-07	1.2E+00	2.9压-07	7.8E-06	1.2E+01	6.5E-07
Aroclor-1260	9.0E-04	6.4E+00	1.4E-04	1.6E-06	9.0E-01	1.7E-06	7.1E-06	7.5E-03	9.5E-04
Dieldrin	7.2E-05	6.5E-01	1.1E-04	5.8E-08	2.2E+00	2.6E-08	8.4E-08	6.5E-01	1.3E-07
Benzo[k]fluoranthene	5.5E-03	1.0E+01	5.5E-04	6.6E-06	1.0E+01	6.6E-07	7.7E-06	1.0E+01	7.7E-07
Bis(2-ethylhexyl)phthalate	1.0E02	3.5E+01	2.9E-04	3.3E-06	3.5E+01	9.3E-08	1.3E-04	3.5E+01	3.8E-06
Fluoranthene	2.1E-02	1.0E+01	2.1E-03	2.5E-05	1.0E+01	2.5E-06	2.9E-05	1.0E+01	2.9E-06
Phenanthrene	8.0E-03	1.0E+01	8.0E-04	9.2E-06	1.0E+01	9.2E-07	1.SE-05	1.0E+01	1.5B-06
Pyrene	2.2E-02	1.0E+01	2.2E-03	2.6E-05	1.0E+01	2.6E-06	3.0E-05	1.0E+01	3.0E-06
1,2-Dichloroethylenes (cis and trans)	2.9E-04	3.0E+01	9.8E-06	5.2E-07	3.0万十01	1.7E-08	4.9E-07	3.0E+01	1.6E-08
Acetone	5.3E-04	6.0E+02	8.9E-07	2.7E-07	6.0E+02	4.4E-10	7.1E-07	6.0E+02	1.2E-09
Methylene chloride	3.1E-04	5.3E+01	6.0E-06	3.7E-07	5.3E+01	7.1E-09	4.7E-07	5.3E+01	9.0E-09
Tetrachloroethylene	1.7E-04	1.0E+02	1.7E-06	2.2E-07	1.0E+02	2.2E-09	2.6E-07	1.0E+02	2.6E-09
Toluene	6.6E-05	7.6E+01	8.6E-07	7.4E-08	7.6E+01	9.8E-10	9.8E-08	7.6E+01	1.3E-09
Trichlorofluoromethane	8.6E-05	3.5E+01	2.5E-06	4.3E-08	3.5E+01	1.2E-09	1.1E-07	3.5E+01	3.3E-09

Table O-2.19

Risk from Lethal or Sublethal Effects for Semi-Aquatic Receptors from Average Exposure Concentrations of CPCs in Food, Unfiltered Surface Water, and Sediment Area 2

Remedial Investigation Report, AOC 57 Devens, Massachusetts

	•			•					
CHEMICAL	PDE	Muskrat RTV	HQ	PDE	<i>Mallard</i> RTV	HO	A PDE	<i>Haccoon</i> RTV	HO
1,2-Dichlorobenzene	0.0E+00	7.6E+02	0.0E+00	0.0E+00	7.6E+02	0.0E+00	0.0E+00	7.6E+02	0.0E+00
1,4-Dichlorobenzene	0.0E+00	7.6E+02	0.0E+00	0.0E+00	7.6E+02	0.0E+00	0.0E+00	7.6E+02	0.0E+00
Benzo(b)fluoranthene	0.0E+00	1.0E+01	0.0E+00	0.0E+00	1.0E+01	0.0E+00	0.0E+00	1.0E+01	0.0E+00
Chrysene	3.9E-03	1.0E+01	3.9E-04	1.6E-06	1.0E+01	1.6E-07	6.2E-06	1.0E+01	6.2E-07
Naphthalene	0.0E+00	3.6E+01	0.0E+00	0.0E+00	3.6E+01	0.0E+00	0.0E+00	3.6E+01	0.0E+00
Benzene	0.0E+00	7.6E+02	0.0E+00	0.0E+00	7.6E+02	0.0E+00	0.0E+00	7.6E+02	0.0E+00
Carbon disulfide	3.3E-05	1.1E+01	3.0E-06	5.8E-08	1.1E+01	5.3E-09	5.4E-08	1.1E+01	4.9E-09
Chlorobenzene	0.0E+00	8.9E+01	0.0E+00	0.0E+00	8.9E+01	0.0E+00	0.0E+00	8.9E+01	0.0E+00
Chloroform	2.9E-05	1.6E+02	1.7E-07	5.1E-08	1.6E+02	3.1E-10	4.7E-08	1.6E+02	2.9E-10
Trichloroethylene	8.9E-05	4.8E+02	1.9E-07	1.2E-07	4.8E+02	2.6E-10	1.4E-07	4.8E+02	2.9E-10
Xylene	0.0E+00	5.0E+02	0.0E+00	0.0E+00	5.0E+02	0.0E+00	0.0E+00	5.0E+02	0.0E+00
SUMMARY HAZARD INDEX			4.6E+00			5.0E-03			1.4E-02

PDE = Potential Dietary Exposure (mg/kgBW-day).

RTV = Reference Toxicity Value (mg/kgBW-day)

HQ = Hazard Quotient (calculated by dividing PDE by RTV)

A2SWSDUA.wk1

Table O-2.19

Risk from Lethal or Sublethal Effects for Semi-Aquatic Receptors from Average Exposure Concentrations of CPCs in Food, Unfiltered Surface Water, and Sedimer Area 2

Remedial Investigation Report, AOC 57 Devens, Massachusetts

CHEMICAL	9	Great blue heron	icon
	PDE	RTV	HO
Aluminum	4.6E+01	4.3E+02	1.1E-01
Arsenic	7.9E-02	1.0E+00	7.9E-02
Barium	8.2E-02	2.0E+02	4.1E-04
Cadmium	7.6E-02	1.0E+01	7.6E-03
Chromium	1.7E-01	2.5E+01	6.8E-03
Cobalt	6.3E-01	4.2E+00	1.5E-01
Copper	1.1E+00	1.0E+02	1.1E-02
Lead	7.1E-01	7.5E+01	9.5E-03
Manganese	1.8E+01	4.5E+01	3.9E-01
Mercury	3.7E-01	6.4E - 02	5.7E+00
Nickel	3.0E-01	5.0E+01	6.0E-03
Selenium	7.4E-02	6.0E-01	1.2E-01
Vanadium	1.8E-04	1.1E+01	1.6E-05
Zinc	1.5E+01	2.0E+02	7.7E-02
4,4'-DDD	2.4E-03	1.4E - 01	1.7E-02
4,4'-DDE	2.2E-03	3.9E - 01	5.8E-03
4,4'-DDT	3.5E-03	1.4E - 01	2.5E-02
Aroclor - 1260	6.4E-03	9.0E+00	7.1E-04
Dieldrin	9.7E-05	6.0E-01	1.6E-04
Benzo[k]fluoranthene	1.7E-03	1.0E+01	1.7E-04
Bis(2-ethylhexyl)phthalate	6.1E-02	3.5E+01	1.7E-03
Fluoranthene	6.3E-03	1.0E+01	6.3E-04
Phenanthrene	4.4E-03	1.0E + 01	4.4E-04
Pyrene	6.6E-03	1.0E+01	6.6E-04
1,2-Dichloroethylenes (cis and trans)	3.3E-05	3.0E+01	1.1E-06
Acetone	6.7E-05	6.0E+02	1.1E-07
Methylene chloride	3.7E-05	5.3E+01	7.1E-07
Tetrachloroethylene	2.0E-05	1.0E + 02	2.0E-07
Toluene	7.8E-06	7.6E+01	1.0E-07
Trichlorofluoromethane	1.1E-05	3.5E+01	3.1E-07

Risk from Lethal or Sublethal Effects for Semi-Aquatic Receptors from Average Exposure Concentrations of CPCs in Food, Unfiltered Surface Water, and Sedimer Table O-2.19 Area 2

Remedial Investigation Report, AOC 57 Devens, Massachusetts

CHEMICAL			
	G	Great blue heron	eron
	PDE	RTV	HO
1,2-Dichlorobenzene	0.0E+00	7.6E+02	0.0E+00
1,4-Dichlorobenzene	0.0E+00	7.6E+02	0.0E+00
Benzo(b)fluoranthene	0.0E+00	1.0E + 01	0.0E+00
Chrysene	1.4E-03	1.0E+01	1.4E-04
Naphthalene	0.0E+00	3.6E+01	0.0E+00
Benzene	0.0E+00	7.6E+02	0.0E+00
Carbon disulfide	3.6E-06	1.1E+01	3.3E-07
Chlorobenzene	0.0E+00	8.9E+01	0.0E+00
Chloroform	3.2E-06	1.6E+02	1.9E - 08
Trichloroethylene	1.0E-05	4.8E+02	2.2E-08
• !!	0.0E+00	5.0E+02	00.1
Xviene			0.01

SUMMARY HAZARD INDEX
PDE = Potential Dietary Exposure (mg/kgBW-day). RTV = Reference Toxici

RTV = Reference Toxicity Value (mg/kgBW-day)

Table O – 2.20

Risk from Lethal or Sublethal Effects for Semi-Aquatic Receptors from RME Exposure Concentrations of CPCs in Food, Filtered Surface Water, and Sediment Area 2

Remedial Investigation Report, AOC 57 Devens, Massachusetts

CUIDATICAI	7	Miskrat		7	Mallard		ä	Raccoon	
Canadiacean	PDE	RTV	HO	PDE	RTV	HQ	PDE	RTV	HQ
Aluminum	1.2E+02	4.3E+02	2.8E-01	7.0E-02	4.3E+02	1.6E-04	2.5E-01	4.3E+02	5.8E-04
Arsenic	5.0E+00	5.8E-01	8.5E+00	1.1E-02	1.0E+00	1.1E-02	2.1E-03	5.8E-01	3.6E-03
Barium	1.3E+00	2.0E+02	6.4E-03	1.2E-03	2.0E+02	5.9E-06	1.5E-03	2.0E+02	7.6E-06
Cadmium	0.0E+00	2.2E+01	0.0E+00	0.0E+00	1.0E+01	0.0E+00	0.0E+00	2.2E+01	0.0E+00
Chromium	3.9E-01	3.5E+00	1.1E-01	2.2E-04	2.5E+01	8.9E-06	1.1B-03	3.5E+00	3.2E-04
Cobalt	3.5E-01	4.2E+00	8.4E-02	1.7E-04	4.2E+00	4.0E-05	2.5E-03	4.2E+00	6.0E-04
Copper	2.2E+00	1.0E+02	2.2E-02	2.7E-03	1.0E+02	2.7E-05	4.6E-03	1.0E+02	4.6E-05
Lead	4.1E+00	2.5E+00	1.7E+00	5.1E-03	7.5E+01	6.8E-05	6.4E-03	2.5E+00	2.6E-03
Manganese	5.9E+01	4.5E+01	1.3E+00	9.7E-02	4.5E+01	2.1E-03	1.1E-01	4.5E+01	2.4E-03
Mercury	4.7E-02	9.0E-01	5.3E-02	2.5E-05	6.4E-02	3.9E-04	5.5E-04	1.0E-01	5.5E-03
Nickel	3.8E-01	1.3E+01	2.9E-02	2.5E-04	5.0E+01	5.1E-06	1.3E-03	1.3E+01	9.6E-05
Selenium	1.5E-01	2.0E-01	7.7E-01	2.3E-04	1.8E+00	1.3E-04	5.9E-04	2.0E-01	2.9E-03
Vanadium	0.0E+00	6.0E+00	0.0E+00	0.0E+00	1.1E+01	0.0E+00	0.0E+00	6.0E+00	0.0E+00
Zinc	3.1E+01	2.0E+02	1.6E-01	7.2E-02	2.0E+02	3.6E-04	7.9E-02	2.0E+02	3.9E-04
4,4'-DDD	3.1E-03	2.0E-01	1.6E-02	2.2E-06	1.2E+00	1.9E-06	3.9E~06	1.2E+01	3.2E-07
4,4'-DDE	1.2E-03	2.0E-01	5.8E-03	8.0E-07	5.8E-01	1.4E-06	1.8E-06	1.2E+01	1.5E-07
4,4'-DDT	1.6E-03	2.0E-01	8.0E-03	6.4E-07	1.2E+00	5.5E-07	1.5E-05	1.2E+01	1.2E-06
Aroclor-1260	3.9压-03	6.4E+00	6.1E-04	6.8E-06	9.0E-01	7.5E-06	9.1E-06	7.5E-03	1.2E-03
Dieldrin	3.5E-04	6.5E-01	5.3E-04	2.8E-07	2.2E+00	1.3E-07	4.0E-07	6.5E-01	6.2E-07
Benzo[k]fluoranthene	2.9E-02	1.0E+01	2.9E-03	3.4E-05	1.0E+01	3.4E-06	4.0E-05	1.0E+01	4.0E-06
Bis(2-ethylhexyl)phthalate	5.1E-02	3.5E+01	1.5E-03	1.6E - 05	3.5E+01	4.7E-07	6.6E-04	3.5E+01	1.9E-05
Fluoranthene	5.7E-02	1.0E+01	5.7E-03	6.8E-05	1.0E+01	6.8E-06	7.9E-05	1.0E+01	7.9E-06
Phenanthrene	2.9E-02	1.0E+01	2.9E-03	3.4E-05	1.0E+01	3.4E-06	4.1E-05	1.0E+01	4.1E-06
Pyrene	5.7E-02	1.0E+01	5.7E-03	6.8E-05	1.0E+01	6.8E-06	7.9E-05	1.0E+01	7.9E06
1,2-Dichloroethylenes (cis and trans)	2.5E-03	3.0E+01	8.2E-05	4.4E-06	3.0E+01	1.5E-07	4.1E-06	3.0E+01	1.4E-07
Acetone	2.1E-03	6.0E+02	3.4E-06	1.0E-06	6.0E+02	1.7E-09	2.7E-06	6.0E+02	4.5E-09
Methylene chloride	1.4E-03	5.3E+01	2.6E-05	1.2E-06	5.3E+01	2.3E-08	2.0E-06	5.3E+01	3.7E-08
Tetrachloroethylene	6.9E-04	1.0E+02	6.9E-06	5.6E-07	1.0E+02	5.6E-09	9.7E-07	1.0E+02	9.7E-09
Toluene	2.4E-04	7.6E+01	3.1E-06	2.5E-07	7.6E+01	3.3E-09	3.5E-07	7.6E+01	4.6E-09
Trichlorofluoromethane	5.0E-04	3.5E+01	1.4E-05	2.5E-07	3.5E+01	7.2E-09	6.7E-07	3.5E+01	1.9E-08

Risk from Lethal or Sublethal Effects for Semi-Aquatic Receptors from RME Exposure Concentrations of CPCs in Food, Filtered Surface Water, and Sediment Area 2 Table O-2.20

Remedial Investigation Report, AOC 57 Devens, Massachusetts

CHEMICAL	A PDE	<i>Muskrat</i> RTV	ОН	₩ PDE	Mallard RTV	HO	<i>f</i> PDE	RTV	CH
1,2-Dichlarobenzene	0.0E+00	7.6E+02	0.0E+00	0.0E+00	7.6E+02	0.0E+00	0.0E+00	7.6E+02	0.0E+00
1,4-Dichlorobenzene	0.0E+00	7.6E+02	0.0E+00	0.0E+00	7.6E+02	0.0E+00	0.0E+00	7.6E+02	0.0E+00
Benzo(b)fluoranthene	0.0E+00	1.0E+01	0.0E+00	0.0E+00	1.0E+01	0.0E+00	0.0E+00	1.0E+01	0.0E+00
Chrysene	9.9E-03	1.0E+01	9.9E-04	4.1E-06	1.0E+01	4.1E-07	1.6E-05	1.0E+01	1.6E-06
Naphthalene .	0.0E+00	3.6E+01	0.0E+00	0.0E+00	3.6E+01	0.0E+00	0.0E+00	3.6E+01	0.0E+00
Benzene	0.0E+00	7.6E+02	0.0E+00	0.0E+00	7.6E+02	0.0E+00	0.0E+00	7.6E+02	0.0E+00
Carbon disulfide	1.0E-04	1.1E+01	9.4E-06	1.8E-07	1.1E+01	1.7E-08	1.7E-07	1.1E+01	1.6E-08
Chlorobenzene	0.0E+00	8.9E+01	0.0E+00	0.0E+00	8.9E+01	0.0E+00	0.0E+00	8.9E+01	0.0E+00
Chloroform	6.8E-05	1.6E+02	4.1E-07	1.2E-07	1.6E+02	7.4E-10	1.1E-07	1.6E+02	6.9E-10
Trichloroethylene	5.1E-04	4.8E+02	1.1E-06	6.8E07	4.8E+02	1.4E-09	7.9E-07	4.8E+02	1.6E-09
Xylene	0.0E+00	5.0E+02	0.0E+00	0.0E+00	5.0E+02	0.0E+00	0.0E+00	5.0E+02	0.0E+00
SUMMARY HAZARD INDEX			1.3E+01			1.5E-02			2.0E-02

PDE = Potential Dietary Exposure (mg/kgBW-day). RTV =

RTV = Reference Toxicity Value (mg/kgBW-day)

Table O-2.20 Risk from Lethal or Sublethal Effects for Semi-Aquatic Receptors from RME Exposure Concentrations of CPCs in Food, Filtered Surface Water, and Sediment Area 2

Remedial Investigation Report, AOC 57 Devens, Massachusetts

CHEMICAL		Great blue heron	ron
	PDE	RTV	НО
Aluminum	6.2E+01	4.3E+02	1.5E-01
Arsenic	2.4E-01	1.0E+00	2.4E-01
Barium	1.8E-01	2.0E+02	9.2E-04
Cadmium	0.0E+00	1.0E+01	0.0E+00
Chromium	3.6E-01	2.5E+01	1.4E - 02
Cobalt	1.1E+00	4.2E+00	2.6E-01
Copper	1.5E+00	1.0E+02	1.5E-02
Lead :	1.7E+00	7.5E+01	2.2E-02
Manganese	3.6E+01	4.5E+01	8.1E-01
Mercury	2.5E-01	6.4E-02	3.9E+00
Nickel	4.4E-01	5.0E+01	8.8E-03
Selenium	2.5E-01	6.0E-01	4.1E-01
Vanadium	0.0E+00	1.1E+01	0.0E+00
Zinc	3.5E+01	2.0E+02	1.8E-01
4,4'-DDD	2.6E-03	1.4E - 01	1.9E-02
4,4'-DDE	2.3E-03	3.9E-01	6.0E - 03
4,4'-DDT	6.6E-03	1.4E - 01	4.7E-02
Aroclor-1260	6.6E-03	9.0E+00	7.3E-04
Dieldrin	1.3E-04	6.0E-01	2.1E-04
Benzo[k]fluoranthene	8.7E-03	1.0E + 01	8.7E-04
Bis(2-ethylhexyl)phthalate	3.1E-01	3.5E+01	8.7E - 03
Fluoranthene	1.7E-02	1.0E+01	1.7E-03
Phenanthrene	9.5E-03	1.0E+01	9.5E-04
Pyrene	1.7E-02	1.0E+01	1.7E-03
1,2-Dichloroethylenes (cis and trans)	2.7E-04	3.0E+01	9.2E-06
Acetone	2.6E-04	6.0E+02	4.3E-07
Methylene chloride	1.7E-04	5.3E+01	3.2E-06
Tetrachloroethylene	8.4E-05	1.0E+02	8.4E-07
Toluene	2.8E05	7.6E+01	3.7E-07
Trichlorofluoromethane	6.4E-05	3.5E+01	1.8E-06

Risk from Lethal or Sublethal Effects for Semi-Aquatic Receptors from RME Exposure Concentrations of CPCs in Food, Filtered Surface Water, and Sediment Table O-2.20 Area 2

Remedial Investigation Report, AOC 57 Devens, Massachusetts

CHEMICAL	9	Great blue heron	eron
	PDE	RTV	Ю
1,2-Dichlorobenzene	0.0E+00	7.6E+02	0.0E+00
1,4-Dichlorobenzene	0.0E+00	7.6E+02	0.0E+00
Benzo(b)fluoranthene	0.0E+00	1.0E+01	0.0E+00
Chrysene	3.5E-03	1.0E+01	3.5E-04
Naphthalene	0.0E+00	3.6E+01	0.0E+00
Benzene	0.0E+00	7.6E+02	0.0E+00
Carbon disulfide	1.2E-05	1.1E+01	1.1E-06
Chlorobenzene	0.0E+00	8.9E+01	0.0E+00
Chloroform	7.6E-06	1.6E+02	4.6E-08
Trichloroethylene	6.0E-05	4.8E+02	1.2E-07
Xylene	0.0E+00	5.0E+02	0.0E+00
Aylene	00+000	2.0E+02	0.05+0

SUMMARY HAZARD INDEX
PDE = Potential Dietary Exposure (mg/kgBW-day). RTV = Ref

RTV = Reference Toxicity Value (mg/kgBW-day)

6.1E+00

Table 0-2.21

Risk from Lethal or Sublethal Effects for Semi-Aquatic Receptors from Average Exposure Concentrations of CPCs in Food, Filtered Surface Water, and Sediment Area 2

Remedial Investigation Report, AOC 57 Devens, Massachusetts

CHEMICAL :	M Httd	Muskrat RTV	CH	M. Hud	Mallard RTV	СĦ	R _z	Raccoon	OH.
Aluminum	8.6E+01	4.3E+02	2.0E-01	5.1B-02	4.3E+02	1.2E-04	1.8E-01	4.3E+02	4.2E-04
Arsenic	1.6E+00	5.8E-01	2.7E+00	3.6E-03	1.0E+00	3.6E-03	6.6E04	5.8E-01	1.1E-03
Barium	5.6E-01	2.0E+02	2.8E-03	5.2E-04	2.0E+02	2.6E-06	6.6E-04	2.0E+02	3.3E-06
Cadmium	0.0E+00	2.2E+01	0.0E+00	0.0E+00	1.0E+01	0.0E+00	0.0E+00	2.2E+01	0.0E+00
Chromium	1.9E-01	3.5E+00	5.3E-02	1.1E-04	2.5E+01	4.2E-06	5.3E-04	3.5E+00	1.5E-04
Cobalt	2.1E-01	4.2E+00	4.9E-02	9.7E-05	4.2E+00	2.3E-05	1.5E-03	4.2E+00	3.5E-04
Copper	5.1E-01	1.0E+02	5.1E-03	6.2E-04	1.0E+02	6.2E-06	1.1E-03	1.0E+02	1.1E-05
Lead	1.8E+00	2.5E+00	7.1E-01	2.2E-03	7.5E+01	2.9E-05	2.7E-03	2.5E+00	1.1E-03
Manganese	1.8E+01	4.5E+01	4.1E-01	3.0E-02	4.5E+01	6.6E-04	4.0E-02	4.5E+01	8.8E-04
Mercury	1.1E-02	9.0E-01	1.2E-02	5.7E-06	6.4E-02	8.8E-05	1.2E-04	1.0E-01	1.2E-03
Nickel	2.6E-01	1.3E + 01	2.0E-02	1.7E-04	5.0E+01	3.5E-06	8.5E-04	1.3E+01	6.6E-05
Selenium	4.6E-02	2.0E-01	2.3E-01	7.0E-05	1.8E+00	4.0E-05	1.8E-04	2.0E-01	8.8E-04
Vanadium	0.0E+00	6.0E+00	0.0E+00	0.0E+00	1.1E+01	0.0E+00	0.0E+00	6.0E+00	0.0E+00
Zinc	1.4E+01	2.0E+02	6.9E-02	3.2E-02	2.0E+02	1.6E-04	3.5E-02	2.0E+02	1.7E-04
4,4'-DDD	1.1E-03	2.0E-01	5.3E-03	7.2E-07	1.2E+00	6.2E-07	1.3E-06	1.2E+01	1.1E-07
4,4"-DDE	4.0E-04	2.0E-01	2.0E-03	2.8E-07	5.8E-01	4.8E-07	8.6E-07	1.2E+01	7.2E-08
4,4'-DDT	8.4E-04	2.0E - 01	4.2E-03	3.3E-07	1.2E+00	2.9E-07	7.8E-06	1.2E+01	6.5E-07
Aroclor-1260	9.0E-04	6.4E+00	1.4E-04	1.6E-06	9.0E-01	1.7E-06	7.1E-06	7.5E-03	9.5E-04
Dieldrin	7.2E-05	6.5E-01	1.1E-04	5.8E-08	2.2E+00	2.6E-08	8.4E-08	6.5E-01	1.3E-07
Benzo[k]fluoranthene	5.5E-03	1.0E+01	5.5E-04	6.6E-06	1.0E+01	6.6E-07	7.7E-06	1.0E+01	7.7E-07
Bis(2-ethylhexyl)phthalate	1.0E-02	3.5E+01	2.9压-04	3.3E-06	3.5E+01	9.3E-08	1.3E-04	3.5E+01	3.8E-06
Fluoranthene	2.1E-02	1.0E+01	2.1E-03	2.5E-05	1.0E+01	2.5E-06	2.9E-05	1.0E+01	2.9E-06
Phenanthrene	8.0E03	1.0E+01	8.0E-04	9.2E-06	1.0E+01	9.2E-07	1.5E-05	1.0E+01	1.5E-06
Pyrene	2.2E-02	1.0E+01	2.2E-03	2.6E-05	1.0E+01	2.6E-06	3.0E-05	1.0E+01	3.0E-06
1,2-Dichloroethylenes (cis and trans)	2.9E-04	3.0E+01	9.8E-06	5.2E-07	3.0E+01	1.7E-08	4.9E-07	3.0E+01	1.6E-08
Acetone	5.3E-04	6.0E+02	8.9E-07	2.7E-07	6.0E+02	4.4E-10	7.1E-07	6.0E+02	1.2E-09
Methylene chloride	3.1E-04	5.3E+01	6.0E-06	3.7E-07	5.3E+01	7.1E-09	4.7E-07	5.3E+01	9.0E-09
Tetrachloroethylene	1.7E-04	1.0E+02	1.7E-06	2.2E-07	1.0E+02	2.2E-09	2.6E-07	1.0E+02	2.6E-09
Toluene	6.6E-05	7.6E+01	8.6E-07	7.4E-08	7.6E+01	9.8E-10	9.8E-08	7.6E+01	1.3E-09
Trichlorofluoromethane	8.6E-05	3.5E+01	2.5E-06	4.3E-08	3.5E+01	1.2E-09	1.1E-07	3.5E+01	3.3E-09

Risk from Lethal or Sublethal Effects for Semi-Aquatic Receptors from Average Exposure Concentrations of CPCs in Food, Filtered Surface Water, and Sediment Area 2 Table O-2.21

Remedial Investigation Report, AOC 57 Devens, Massachusetts

CHEMICAL	~	Muskrat		7	Mallard			Raccoon	
	PDE	RTV	HQ	PDE	RTV	HQ	PDE	RTV	Ю
1,2-Dichlarobenzene	0.0E+00	7.6E+02	0.0E+00	0.0E+00	7.6E+02	0.0E+00	0.0E+00	7.6E+02	0.0E+00
1,4-Dichlarobenzene	0.0E+00	7.6E+02	0.0E+00	0.0E+00	7.6E+02	0.0E+00	0.0E+00	7.6E+02	0.0E+00
Benzo(b)fluoranthene	0.0E+00	1.0E + 0.1	0.0E+00	0.0E+00	1.0E+01	0.0E+00	0.0E+00	1.0E+01	0.0E+00
Chrysene	3.9E-03	1.0E+01	3.9E-04	1.6E-06	1.0E+01	1.6E-07	6.2E-06	1.0E+01	6.2E-07
Naphthalene	0.0E+00	3.6E+01	0.0E+00	0.0E+00	3.6E+01	0.0E+00	0.0E+00	3.6E+01	0.0E+00
Berzene ·	0.0E+00	7.6E+02	0.0E+00	0.0E+00	7.6E+02	0.0E+00	0.0E+00	7.6E+02	0.0E+00
Carbon disulfide	3.3E-05	1.1E+01	3.0E-06	5.8E-08	1.1E+01	5.3E-09	5.4E-08	1.1E+01	4.9E-09
Chlorobenzene	0.0E+00	8.9E+01	0.0E+00	0.0E+00	8.9E+01	0.0E+00	0.0E+00	8.9E+01	0.0E+00
Chloroform	2.9E-05	1.6E+02	1.7E-07	5.1E-08	1.6E+02	3.1E-10	4.7E-08	1.6E+02	2.9E-10
Trichloroethylene	8.9E05	4.8E+02	1.9E-07	1.2E-07	4.8E+02	2.6E-10	1.4E-07	4.8E+02	2.9E-10
Xylene	0.0E+00	5.0E+02	0.0E+00	0.0E+00	5.0E+02	0.0E+00	0.0E+00	5.0E+02	0.0E+00
						N			
SUMMARY HAZARD INDEX			4.5E+00			4.8E-03			7.4E-03

PDE = Potential Dietary Exposure (mg/kgBW-day).

RTV = Reference Toxicity Value (mg/kgBW-day)

Table O-2.21

Risk from Lethal or Sublethal Effects for Semi-Aquatic Receptors from Average Exposure Concentrations of CPCs in Food, Filtered Surface Water, and Sediment Area 2

Remedial Investigation Report, AOC 57 Devens, Massachusetts

CHEMICAL	6	Great blue heron	eron
	PDE	RTV	HQ
Aluminum	4.6E+01	4.3E+02	1.1E-01
Arsenic	7.8E-02	1.0E+00	7.8E-02
Barium	8.0E-02	2.0E+02	4.1E-04
Cadmium	0.0E+00	1.0E+01	0.0E+00
Chromium	1.7E-01	2.5E+01	6.8E-03
Cobalt	6.3E-01	4.2E+00	1.5E-01
Copper	3.5B-01	1.0E+02	3.5E-03
Lead	7.1E-01	7.5E+01	9.4E-03
Manganese	1.4E+01	4.5E+01	3.2E-01
Mercury	5.7E-02	6.4E-02	8.8E-01
Nickel	3.0E-01	5.0E+01	6.0E-03
Selenium	7.4E-02	6.0E-01	1.2E-01
Vanadium	0.0E+00	1.1E+01	0.0E+00
Zinc	1.5E+01	2.0E+02	7.7E-02
4,4'-DDD	2.4E-03	1.4E - 01	1.7E-02
4,4'-DDE	2.2E-03	3.9E-01	5.8E-03
4,4'-DDT	3.5E-03	1.4E - 01	2.5E-02
Aroclor-1260	6.4E-03	9.0E+00	7.1E-04
Dieldrin	9.7E-05	6.0E - 01	1.6E-04
Benzo[k]fluoranthene	1.7E-03	1.0E+01	1.7E-04
Bis(2-ethylhexyl)phthalate	6.1E-02	3.5E+01	1.7E-03
Fluoranthene	6.3E-03	1.0E+01	6.3E-04
Phenanthrene	4.4E-03	1.0E+01	4.4E-04
Pyrene	6.6E-03	1.0E+01	6.6E-04
1,2-Dichloroethylenes (cis and trans)	3.3E-05	3.0E+01	1.1E-06
Acetone	6.7E-05	6.0E+02	1.1E-07
Methylene chloride	3.7E-05	5.3E+01	7.1E-07
Tetrachloroethylene	2.0E-05	1.0E+02	2.0E-07
Toluene	7.8E-06	7.6E+01	1.0E-07
Trichloroffuoromethane	1.1E-05	3.5E+01	3.1E-07

Table O – 2.21

Risk from Lethal or Sublethal Effects for Semi-Aquatic Receptors from Average Exposure Concentrations of CPCs in Food, Filtered Surface Water, and Sediment Area 2

Remedial Investigation Report, AOC 57 Devens, Massachusetts

PDE RTW F 1,2-Dichlorobenzene 0.0E+00 7.6E+02 1,4-Dichlorobenzene 0.0E+00 7.6E+02 Benzo(b)fluoranthene 0.0E+00 7.6E+02 Chrysene 1.4E-03 1.0E+01 Naphthalene 0.0E+00 3.6E+01 Benzene 0.0E+00 7.6E+02 Carbon disulfide 3.6E-06 1.1E+01 Chlorobenzene 0.0E+00 8.9E+01 Chloroform 3.2E-06 1.6B+02 Trichloroethylene 1.0E-05 4.8E+02	Ā	Gr	Great blue heron	ron
cene 0.0E+00 cene 0.0E+00 lene 0.0E+00 1.4E-03 0.0E+00 0.0E+00 3.6E-06 1.0E-05		Œ	RTV	HO
1.4B-03 1.4B-03 1.0B+00 1.0B-00 1.0B-00 1.0B-05		0E+00	7.6E+02	0.0E+00
1.4B-03 1.4B-03 0.0B+00 0.0B+00 3.6B-06 3.2B-06 1.0B-05	•	0E+00	7.6E+02	0.0E+00
1,4E-03 0.0E+00 0.0E+00 3,6E-06 0.0E+00 3,2E-06 1.0E-05		0E+00	1.0E+01	0.0E+00
0.0E+00 0.0B+00 3.6E-06 0.0E+00 3.2E-06 1.0E-05		4E-03	1.0E+01	1.4E-04
0.0E+00 3.6E-06 0.0E+00 3.2B-06 1.0E-05		0E+00	3.6E+01	0.0E+00
3.6E-06 0.0E+00 3.2E-06 1.0E-05		0E+00	7.6E+02	0.0E+00
0.0E+00 3.2E-06 1.0E-05		6E-06	1.1E+01	3.3E-07
3.2E-06 1.0E-05		0E+00	8.9E+01	0.0E+00
1.0E-05		2E-06	1.6E+02	1.9E-08
		0E-05	4.8E+02	2.2E-08
Xylene 0.0E+00 5.0E+02	•			
UUETUU		31.30	70	

SUMMARY HAZARD INDEX

PDE = Potential Dietary Exposure (mg/kgBW-day). RTV = Ref

RTV = Reference Toxicity Value (mg/kgBW-day)

1.8E+00

Table 0-2.22 Risk from Lethal or Sublethal Effects for Semi-Aquatic Receptors from RME Exposure Concentrations of CPCs in Food, Unfiltered Surface Water, and Sediment Area 3

Remedial Investigation Report, AOC 57 Devens, Massachusetts

CHEMICAL	R	Raccoon	
	PDE	RTV	HQ
Arsenic	6.9B-06	5.8B-01	1.2B-05
Barium	1.2B-05	2.0B+02	6.3B-08
Copper	3.8E-04	1.0B+02	3.8B-06
Lead	82B-06	2.5E+00	3.3B-06
Selenium	1.1B-07	2.0B-01	5.7B-07
Zinc	2.0E-05	2.0E+02	1.0B-07
4,4*-DDD	3.8B-07	1.2B+01	3.1B-08
Aroclor-1260	4.0E-06	7.5B-03	5.3B-04
Benzo[k]fluoranthene	1.1B-06	1.0B+01	1.1B-07
Fluoranthene	2.5B-06	1.0E+01	2.5B-07
Phenanthrene	1.4B-06	1.0E+01	1.4B-07
Pyrene	2.1E-06	1.0E+01	2.1B-07
Acetone	5.3E-07	6.0E+02	8.8E-10
Toluene 🐇	8.4E-08	7.6B+01	1.1B-09
1,2 – Dichlor benzene	1.5E-06	7.6B+02	1.9B-09
1,4-Dichlorobenzene	3.8B-06	7.6B+02	5.0B-09
Benzo(b)fluoranthene	1.8E-06	1.0B+01	1.8B-07
Chrysene	1.3B-06	1.0E+01	1.3B-07
Naphthalene	2.0B-06	3.6B+01	5.6B-08
Benzene	9.3B08	7.6B+02	1.2B-10
Carbon disulfide	2.6B-08	1.1B+01	2.4B-09
Chlorobenzene	2.5E-07	8.9B+01	2.9B-09
Xylene	2.8B - 08	5.0B+02	5.5B-11
Antimony	2.5B-07	4.2B+01	6.0E-09

PDB = Potential Dietary Exposure (mg/kgBW-day).

RTV = Reference Toxicity Value (mg/kgBW-day)

5.5B-04

SUMMARY HAZARD INDEX

O-3 ECOLOGICAL RISK CALCULATIONS FOR CPCs SUPPORTING INFORMATION

TABLE 0-3.1

CHEMICALS ELIMIMATED AS ECOLOGICAL CONTAMINANTS OF POTENTIAL CONCERN IN AREA 2 UPLAND SURFACE SOIL¹ **AOC 57**

REMEDIAL INVESTIGATION REPORT DEVENS, MASSACHUSETTS

							200000000000000000000000000000000000000
	Frequency		Range of	Background	Average	Exposure Point	Point
	jo	Range of	Detected	Surface Soff		Concentrations	ations
ANALYTE	Detection®	SQLs³	Concentrations	Concentrations Concentrations		KME	Average
PAL METALS (µg/g)							
Aliminim	2/2	¥	3,920 to 7,530	18,000	6,700	۲,	6,700
	5/5	Ą	18.8 to 40.9	54	26.3	40.9	26.3
Dallulii	7/5	. 5.	0.71	0.81	0.34	0.71	0.34
Seryillum	5/5	e N	7.7 to 27	33	15.9	27.0	15.9
	5/5	ξ χ	8.1 to 22.9	48	14.0	22.9	14.0
Vonadiim		ž	7.6 to 15.5	32.3	12.0	15.5	12.0
Zinc	5/5	¥	13.7 to 38.1	43.9	24.2	38.1	24.2

Sample locations include: 57B-95-01X, 57B-95-02X, 57E-95-02X, 57E-95-10X, and 57E-95-25X (all collected from 0 to 2 feet below ground surface).

² Frequency of Detection is equal to the number of samples in which the analyte is detected in relation to the total number of samples analyzed.

³ Sample Quantitation Limits (SQLs) are equal to the detection limit adjusted for percent moisture (solid media only) and dilutions (if any are performed).

4 Inorganic background concentrations from the Ft. Devens background surface soil database (developed in 1993). ⁵ The average of all concentrations assigns a value of 1/2 the SQL to all non-detects.

⁶ Reasonable Maximum Exposure (RME) concentrations are equal to the maximum detected concentration; the 95th percent UCL was not calculated

because there are fewer than 10 samples in the data set.
⁷ Average Exposure Point Concentrations (EPCs) are equal to the average of all concentrations. If the average is greater than the RME,

µg/g = micrograms per gram

then the RME was used instead.

AOC = Area of contamination.

CPC = Contaminant of potential concern.

NA = Not available.

PAL = Project analyte list.

RME = Reasonable maximum exposure.

CHEMICALS ELIMIMATED AS ECOLOGICAL CONTAMINANTS OF POTENTIAL CONCERN IN AREA 2 FLOODPLAIN SURFACE SOIL¹ **TABLE 0-3.2 AOC 57**

REMEDIAL INVESTIGATION REPORT

DEVENS, MASSACHUSETTS

ANALYTE	Frequency of	Range of		Background Surface Soil	Average of all	Exposure Point Concentrations	Point ations
PAL METALS (μg/g)	Detection -	SCES	Concentrations	Concentration	Concentrations	KME Average	verage
Aluminum	3/3	NA	3,140 to 6,180	18,000	4,930	6,180	4,930
Beryllium	1/3	0.5	0.71	0.81	0.40	0.71	0.40
Chromium	3/3	AN	9.0 to 15.4	33	12.7	15.4	12.7
Cobalt	3/3	NA	1.9 to 2.3	4.7	2.1	2.3	2.1
Nickel	3/3	AN	6.1 to 10.4	14.6	6.7	10.4	7.9
Vanadium	3/3	NA	5.7 to 14	32.3	10.7	14	10.7

Notes:

µg/g = micrograms per gram

AOC = Area of contamination.

CPC = Contaminant of potential concern.

NA = Not available.

PAL = Project analyte list.

RME = Reasonable maximum exposure.





Sample locations include: 57E-95-12X, 57E-95-16X, and 57E-95-17X.

² Frequency of Detection is equal to the number of samples in which the analyte is detected in relation to the total number of samples analyzed.

³ Sample Quantitation Limits (SQLs) are equal to the detection limit adjusted for percent moisture (solid media only) and dilutions (if any are performed).

⁴ Inorganic background concentrations from the Ft. Devens background surface soil database (developed in 1993)

 $^{^5}$ The average of all concentrations assigns a value of 1/2 the SQL to all non-detects.

⁶ Reasonable Maximum Exposure (RME) concentrations are equal to the maximum detected concentration; the 95th percent UCL was not

calculated because there were fewer than 10 samples in the dataset.

⁷ Average Exposure Point Concentrations (EPCs) are equal to the average of all concentrations. If the average is greater than the RME, then the RME was used instead.

CHEMICALS ELIMINATED AS ECOLOGICAL CONTAMINANTS OF POTENTIAL CONCERN IN AREA 3 SURFACE SOIL¹

AOC 57

REMEDIAL INVESTIGATION REPORT DEVENS, MASSACHUSETTS

	Frequency		Range of	Background	Average	Exposu	Exposure Point
ANALYTE	of Detection ²	Range of SQLs 3	Detected Concentrations	Surface Soil Concentration *	of all Concentrations \$	Concer RME	Concentrations
PAL METALS (μg/g)							
Aluminum	2/2	ΑΝ	6,370 to 7,100	18,000	6,740	7,100	6,740
Barium	4/4	N AN	11.1 to 29.3	54	18.0	29.3	18.0
Chromium	2/2	N A	10.6 to 11.7	33	11.2	11.7	11.2
Cobalt	2/2	AN	2.4 to 3.2	4.7	2.8	3.2	2.8
Copper	4/4	NA	2.9 to 6.8	13.5	4.6	6.8	4.6
Lead	3/4	10.5	7.8 to 32.7	48	16.9	32.7	16.9
Nickel	2/2	NA	10.5 to 11.1	14.6	10.8	1.1	10.8
Vanadium	2/2	A A	9.2 to 9.4	32.3	9.3	9.4	9.3
Zinc	4/4	NA	15.8 to 28.5	43.9	22.1	28.5	22.1

Notes:

¹ Sample locations include: 57B-96-08X, 57B-96-09X, 57S-98-13X, and 57S-98-14X.

² Frequency of Detection is equal to the number of samples in which the analyte is detected in relation to the total number of samples analyzed.

³ Sample Quantitation Limits (SQLs) are equal to the detection limit adjusted for percent moisture (solid media only) and dilutions (if any are performed).

⁴ Inorganic background concentrations from the Ft. Devens background surface soil database (developed in 1993)

 5 The average of all concentrations assigns a value of 1/2 the SQL to all non-detects.

6 Reasonable Maximum Exposure (RME) concentrations are equal to the maximum detected concentration; the 95th percent UCL was not calculated because there are fewer than 10 samples in the data set. 7 Average Exposure Point Concentrations (EPCs) are equal to the average of all concentrations. If the average is greater than the RME, then the RME was used instead.

µg/g = micrograms per gram

AOC = Area of contamination.

CPC = Contaminant of potential concern.

NA = Not available.

PAL = Project analyte list.

RME = Reasonable maximum exposure.

TABLE 0-3.4

CHEMICALS ELIMINATED AS ECOLOGICAL CONTAMINANTS OF POTENTIAL CONCERN IN AREA 3 SURFACE WATER¹ **AOC 57**

REMEDIAL INVESTIGATION REPORT DEVENS, MASSACHUSETTS

ANALYTE	Frequency of Detection ²	Range of SQLs 1	Range of Detected Concentrations	Upgradient Surface Water Concentration *	Average of all Concentrations ⁶	Exposu Concen RME ⁶	re Point trations Average 7
PAL UNFILTERED METALS (µg/L)							
Manganese	1/1	NA	92.8	131	92.8	92.8	92.8

Notes:

- ¹ Sample locations include: 57W-98-07X. Manganese data were rejected in 4 out of 5 surface water samples.
- ² Frequency of Detection is equal to the number of samples in which the analyte is detected in relation to the total number of samples analyzed.
- ³ Sample Quantitation Limits (SQLs) are equal to the detection limit adjusted for percent moisture (solid media only) and dilutions (if any are performed).
- ⁴ The arithmetic mean of inorganic concentrations detected in upgradient samples 57W-95-03X and -08X.
- 5 The average of all concentrations assigns a value of 1/2 the SQL to all non-detects.
- 6 Reasonable Maximum Exposure (RME) concentrations are equal to the maximum detected concentration; the 95th percent UCL was not calculated because there are fewer than 10 samples in the data set.
- 7 Average Exposure Point Concentrations (EPCs) are equal to the average of all concentrations. If the average is greater than the RME, then the RME was used instead.

µg/L = micrograms per liter

AOC = Area of contamination.

CPC = Contaminant of potential concern.

NA = Not available.

PAL = Project analyte list.

RME = Reasonable maximum exposure.







CHEMICALS ELIMINATED AS ECOLOGICAL CONTAMINATNS OF POTENTIAL CONCERN IN AREA 2 SEDIMENT¹ AOC 57

REMEDIAL INVESTIGATION REPORT DEVENS, MASSACHUSETTS

ANALYTE PAL METALS (µg/g) Cadmium

Notes:

Sample locations include: 57D-95-04X through 57D-95-07X, 57D-95-09X, and 57D-95-10X.

² Frequency of Detection is equal to the number of samples in which the analyte is detected in relation to the total number of samples analyzed.

³ Sample Quantitation Limits (SQLs) are equal to the detection limit adjusted for percent moisture (solid media only) and dilutions (if any are performed).

⁴ The arithmetic mean of concentrations detected in upgradient samples 57D-95-03X and -08X.

⁵ Rojko, 1990. "Proposed Classification Scheme for Sediments in Massachusetts Lakes and Ponds". Values less than the provided range are classified as "normal", and values greater than the provided range are classified as "highly elevated".

⁶ The average of all concentrations assigns a value of 1/2 the SQL to all non-detects.

⁷ Reasonable Maximum Exposure (RME) concentrations are equal to the maximum detected concentration; the 95th percent UCL was not calucated because there are fewer than 10 samples in the data set.

⁸ Average Exposure Point Concentrations (EPCs) are equal to the lesser of the average of all concentrations and RME.

ug/g = micrograms per gram

AOC = Area of contamination.

CPC = Contaminant of potential concern.

NA = Not available.

PAL = Project analyte list.

RME = Reasonable maximum exposure.

SQL = Sample quantitation limit.

TABLE 0-3.6

CHEMICALS ELIMINATED AS ECOLOGICAL CONTAMINANTS OF POTENTIAL CONCERN IN AREA 3 SEDIMENT¹ **AOC 57**

REMEDIAL INVESTIGATION REPORT DEVENS, MASSACHUSETTS

ANALYTE	Frequency of Detection ²	Range of SQLS 1	Range of Detected Concentrations	Upgradient Sediment Concentration *	Elevated Sediment Concentration ⁵	Average of all Concentrations	Expos Conce RME ⁷	Exposure Point Concentrations ME 7 Average 1
PAL METALS (µg/g)								
Arsenic	2/2	AN A	3.2 to 37.1	110	25-50	20.0	37.1	20.0
Barium	2/2	AN N	16.1 to 59.8	101	AN	33.0	59.8	33.0
Copper	3/5	0.97	2.7 to 11.2	30.7	70-130	4.0	11.2	4.0
Lead	2/5	10.5	33.6 to 64.6	208	200-410	22.8	64.6	22.8
Manganese	2/2	Y V	29 to 459	1,510	350-850	188	459	188
Selenium	4/5	0.25	0.72 to 1.8	2.8	N	1.1	1.8	1.1
Zinc	1/5	8.0	8.06	315	250-450	21.4	90.8	21.4

Notes

- Sample locations include: 57D-98-04X through 57D-98-08X.
- 2 Frequency of Detection is equal to the number of samples in which the analyte is detected in relation to the total number of samples analyzed.
- 3 Sample Quantitation Limits (SQLs) are equal to the detection limit adjusted for percent moisture (solid media only) and dilutions (if any are performed).
- ¹ The arithmetic mean of inorganic concentrations detected in upgradient samples 57D-95-03X and -08X.
- ⁵ Rojko, 1990. "Proposed Classification Scheme for Sediments in Massachusetts Lakes and Ponds". Values less than the provided range are classified as "normal", and values greater than the provided range are classified as "highly elevated".
- 6 The average of all concentrations assigns a value of 1/2 the SQL to all non-detects.
- Reasonable Maximum Exposure (RME) concentrations are equal to the maximum detected concentration; the 95th percent UCL was not calucated because there are
 - Average Exposure Point Concentrations (EPCs) are equal to the average of all concentrations. If the average is greater than the RME, then the RME was used instead. fewer than 10 samples in the data set.

µg/g = micrograms per gram

AOC = Area of contamination.

CPC = Contaminant of potential concern.

NA = Not available.

PAL = Project analyte list.

RME = Reasonable maximum exposure.

SQL = Sample quantitation limit.





TABLE O-3.7 RESULTS OF FOOD-WEB MODELING FOR SURFACE SOIL, SEDIMENT, AND SURFACE WATER AOC 57

REMEDIAL INVESTIGATION REPORT DEVENS, MASSACHUSETTS

Media Evaluated Ecological Receptor	HIs for RME Concentra- tions of Chemicals Eliminated as CPCs [a]	HIs for RME Concentrations of CPCs [b]	Total Risk for CPCs and Chemicals Eliminated as CPCs
Area 2 Upland Surface Soil			
White-footed mouse	0.17	1.5	1.7
American robin	0.32	0.94	1.3
Red fox	0.000034	0.000077	0.00011
Barred owl	0.00011	0.00021	0.00032
Area 2 Floodplain Surface Soil			
White-footed mouse	0.096	4.0	-4 .1
Short-tailed shrew	0.20	2.4	2.6
American robin	0.17	1.8	2.0
Raccoon	0.00011	0.037	0.037
Barred owl	0.000039	0.00028	0.00032
Area 3 Surface Soil			
White-footed mouse	0.17	3.0	3.2
American robin	0.13	0.91	1.0
Red fox	0.000013	0.0011	0.0011
Barred owl	0.000037	0.00034	0.00038
Area 2 Sediment			
Muskrat	0.055	13	13
Mallard	0.000030	0.015	0.015
Raccoon	0.00015	0.028	0.028
Great blue heron	0.036	12	12
Area 3 Sediment and Unfiltered Surface Water			·
Raccoon	0.00062	0.00064	0.0013

[[]a] The information listed is summarized from Tables O-4.1 through O-4.10 in Appendix O-4. These values are HIs calculated for all chemicals eliminated as CPCs in the baseline ERA.

[[]b] The information listed was obtained from Table 9-60. These values are HIs calculated for all chemicals retained as CPCs in the baseline ERA.

CPC = Chemical of Potential Concern

HI = Hazard Index

NA = Not applicable.

RME = Reasonable Maximum Exposure

TABLE O-3.8 SUMMARY OF ECOLOGICAL RISK FOR PLANTS AND INVERTEBRATES FROM CHEMICALS ELIMINATED AS CPCs IN AREA 2 UPLAND SURFACE SOIL AOC 57

REMEDIAL INVESTIGATION REPORT DEVENS, MASSACHUSETTS

Analyte	Exposur Concenti		And an Cross same and the same	(h z/2)	SHOULD SEE THE CONTRACTOR SECTION SERVICES	exceeded? ? IE / by Avg.)
	RME	Average	Plant ¹	Invertebrate ²	Plant	Invertebrate
PAL Metals (μg/g)						
Aluminum	7,530	6,700	50	NA	Yes/Yes	NA
Barium	40.9	26.3	500	NA	No/No	NA
Beryllium	0.71	0.34	10	NA	No/No	NA
Chromium	27.0	15.9	1	250	Yes/Yes	No/No
Lead	22.9	14.0	50	1,190	No/No	No/No
Vanadium	15.5	12.0	2	NA	Yes/Yes	NA
Zinc	38.1	24.2	50	130	No/No	No/No

Exposure Point Concentrations (EPCs) are presented in Table O-3.1.

Comparison shown is maximum EPC to RTV/average EPC to RTV.

RTV = reference toxicity value.

 $\mu g/g = micrograms per gram.$

 LC_{50} = concentration lethal to 50% of the test population.

LOEC = lowest observed effect concentration.

NA = Not available.

RME = Reasonable maximum exposure.

Shading indicates exceedances.

Plant and invertebrate RTVs are presented in Appendix O-1, Tables O-1.7 and O-1.8 (respectively). Generally, the plant RTVs are the lowest LOEC from among plant growth studies on plants in solid media, and invertebrate RTVs are the lowest LC₅₀ (14-day soil test on *Eisenia foetida*) from among chemicals in the same chemical class (applies to organic compounds). A conservative factor of 0.2 was applied to invertebrate RTVs; the resultant value should be protective of 99.9% of the population from lethal effects (USEPA, 1986).

TABLE O-3.9 SUMMARY OF ECOLOGICAL RISK FOR PLANTS AND INVERTEBRATES FROM CHEMICALS ELIMINATED AS CPCs IN AREA 2 FLOODPLAIN SURFACE SOIL AOC 57

REMEDIAL INVESTIGATION REPORT DEVENS, MASSACHUSETTS

Analyte	Exposur Concenti		RTV	, (nā\ā)	**************************************	xceeded? 3 E/by Avg.)
	RME	Average	Plant ²	Invertebrate ²	Plant	Invertebrate
PAL Metals (μg/g)					marin and all your en annual manager and great	
Aluminum	6,180	4,930	50	NA	Yes/Yes	NA
Beryllium	0.71	0.40	10	NA	No/No	NA
Chromium	15.4	12.7	1	250	Yes/Yes	No/No
Cobalt	2.3	2.1	20	NA	No/No	NA
Nickel	10.4	7.9	30	400	No/No	No/No
Vanadium	14	10.7	2	NA	Yes/Yes	NA

Exposure Point Concentrations (EPCs) are presented in Table O-3.2.

Comparison shown is maximum EPC to RTV/average EPC to RTV.

RTV = reference toxicity value.

 $\mu g/g = micrograms per gram.$

 LC_{50} = concentration lethal to 50% of the test population.

LOEC = lowest observed effect concentration.

NA = Not available.

RME = Reasonable maximum exposure.

Shading indicates exceedances.

Plant and invertebrate RTVs are presented in Appendix O-1, Tables O-1.7 and O-1.8 (respectively). Generally, the plant RTVs are the lowest LOEC from among plant growth studies on plants in solid media, and invertebrate RTVs are the lowest LC₅₀ (14-day soil test on *Eisenia foetida*) from among chemicals in the same chemical class (applies to organic compounds). A conservative factor of 0.2 was applied to invertebrate RTVs; the resultant value should be protective of 99.9% of the population from lethal effects (USEPA, 1986).

TABLE O-3.10 SUMMARY OF ECOLOGICAL RISK FOR PLANTS AND INVERTEBRATES FROM CHEMICALS ELIMINATED AS CPCs IN AREA 3 SURFACE SOIL AOC 57

REMEDIAL INVESTIGATION REPORT DEVENS, MASSACHUSETTS

Analyte	Exposur Concenti		RTV	, (n 8 \8)		Exceeded? 3 E / by Avg.)
	RME	Average	Plant ²	Invertebrate 2	Plant	Invertebrate
PAL Metals (μg/g)						
Aluminum	7,100	6,740	50	NA	Yes/Yes	NA
Barium	29.3	18.0	500	NA	No/No	NA
Chromium	11.7	11.2	1	250	Yes/Yes	No/No
Cobalt	3.2	2.8	20	NA	No/No	NA
Copper	6.8	4.6	100	30	No/No	No/No
Lead	32.7	16.9	50	1,190	No/No	No/No
Nickel	11.1	10.8	30	400	No/No	No/No
Vanadium	9.4	9.3	2	NA	Yes/Yes	NA
Zinc	28.5	22.1	50	130	No/No	No/No

Exposure Point Concentrations (EPCs) are presented in Table O-3.3.

RTV = reference toxicity value.

 $\mu g/g = micrograms per gram.$

 LC_{50} = concentration lethal to 50% of the test population.

LOEC = lowest observed effect concentration.

NA = Not available.

RME = Reasonable maximum exposure.

Shading indicates exceedances.

Plant and invertebrate RTVs are presented in Appendix O-1, Tables O-1.7 and O-1.8 (respectively). Generally, the plant RTVs are the lowest LOEC from among plant growth studies on plants in solid media, and invertebrate RTVs are the lowest LC₅₀ (14-day soil test on *Eisenia foetida*) from among chemicals in the same chemical class (applies to organic compounds). A conservative factor of 0.2 was applied to invertebrate RTVs; the resultant value should be protective of 99.9% of the population from lethal effects (USEPA, 1986).

³ Comparison shown is maximum EPC to RTV/average EPC to RTV.

TABLE O-3.11 COMPARISON OF AREA 3 SURFACE WATER EXPOSURE CONCENTRATIONS FOR CHEMICALS ELIMINATED AS COCs WITH TOXICITY BENCHMARK VALUES ¹ AOC 57

REMEDIAL INVESTIGATION REPORT DEVENS, MASSACHUSETTS

Analyte	Exposur Concent RME	AGE CONTRACTOR OF THE PROPERTY	AWQC ² (μg/l)	AQUIRE Lowest Reported Adverse Effect Concentration 3 (µg/l) / Test Species	Result
PAL Unfiltered Metals (μg/l) Manganese	92.8	92.8	NA	280/phytoplankton population endpoints	Not exceeded

Results of analyses of surface water samples are included in Section 7. Only those analytes selected as aquatic CPCs in Table O-3.4 are presented.

Notes:

CPC = contaminant of potential concern

μg/l = micrograms per liter

AWQC = Ambient Water Quality Criteria (guidance criteria established under the Clean Water Act)

NA = Not available

² Chronic Federal Ambient Water Quality Criteria (USEPA, 1991 and 1988).

³ From Appendix O-1, Table O-1.9. Only growth, mortality, reproductive, and biomass effects to fish, plants, invertebrates, and amphibians were considered.

COMPARISON OF AREA 2 SEDIMENT EXPOSURE CONCENTRATIONS FOR CHEMICALS ELIMINATED AS CPCs WITH TOXICITY BENCHMARK VALUES 1 **TABLE 0-3.12**

AOC 57

REMEDIAL INVESTIGATION REPORT **DEVENS, MASSACHUSETTS**

nger in projekti in j	0.6 Exceeds benchmark	9.0	9.0	ER-M	ER-L		Average 0.68	Concentrations Maximum Ave	PAL Metals (µg/g)
							\$		PAL Metals (μg/g)
Sept. Si				ER-M	ER-L		¥	Maximum	
1988 S. 9 48						Sediment Quality Guidelines 1	rations	Concern	
en engelennenske si			Control of Section 1997 (Section 1997) (Section 199	ER.N	I. I.	1 0 10 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	A	Concern	PAL Metals (µg/g)

Results of analyses of sediment samples are included in Section 7. Only those analytes selected as aquatic CPCs in Table O-3.5 are presented.

² U.S. Environmental Protection Agency (USEPA, 1988) mean Sediment Quality Criteria (SQCs).

National Oceanic and Atmospheric Administration (NOAA) Effects Range-Low (ER-L) and Effects Range-Median (ER-M) Sediment Guidelines correspond to the concentration

that is protective of the 90th percentile and the 50th percentile of the test populations, respectively (Long et al., 1994).

Ontario Ministry of the Environment (OME) Low Effects Level (LEL) Provincial Sediment Quality Guidelines (Persaud et al., 1996) correspond to a concentration that can be tolerated by the majority of benthic organisms.

New York State Department of Environmental Conservation (NYSDEC) sediment criteria for evaluating chronic toxicity to benthic aquatic life (NYSDEC, 1994). The values presented for metals represent lowest effect levels (LELs).

µg/g = micrograms per gram
NA = Not available

COMPARISON OF AREA 3 SEDIMENT EXPOSURE CONCENTRATIONS FOR CHEMICALS ELIMINATED AS CPCs WITH TOXICITY BENCHMARK VALUES 1 **TABLE 0-3.13** AOC 57

REMEDIAL INVESTIGATION REPORT **DEVENS, MASSACHUSETTS**

Analyte	Exposure Point Concentrations Maximum Aver	e Point rations Average	USEPA Sediment Quality Guidelines 2	NOAA*	A	OME LEL.*	OMELEL* NYSDECIEL*	Result
PAL Metals (μg/g)								
Arsenic	37.1	20.0	AN	8.2	02	0.9	6.0	Exceeded
Barium	59.8	33.0	N	A	A A	¥	NA	Exceeded 6
Copper	11.2	4.0	N	34	270	16	16	Not exceeded
Lead	64.6	22.8	N A	46.7	218	31	31	Exceeded
Manganese	459	188	NA	ž	N A	460	460	Not exceeded
Selenium	8.	1.1	NA NA	¥	A A	Ą	NA NA	No benchmark available
Zinc	90.8	21.4	NA	150	410	120	120	Not exceeded

1 Results of analyses of sediment samples are included in Section 7. Only those analytes selected as aquatic CPCs in Table O-3.6 are presented.

U.S. Environmental Protection Agency (USEPA, 1988) mean Sediment Quality Criteria (SQCs).

National Oceanic and Atmospheric Administration (NOAA) Effects Range-Low (ER-L) and Effects Range-Median (ER-M) Sediment Guidelines correspond to the concentration

that is protective of the 90th percentile and the 50th percentile of the test populations, respectively (Long et al., 1994). Ontario Ministry of the Environment (OME) Low Effects Level (LEL) Provincial Sediment Quality Guidelines (Persaud et al., 1996) correspond to a concentration that can be

New York State Department of Environmental Conservation (NYSDEC) sediment criteria for evaluating chronic toxicity to benthic aquatic life (NYSDEC, 1994). The values for tolerated by the majority of benthic organisms.

A sediment guideline of 20 mg/kg (provided by U.S. EPA Region V for the pollution classification of Great Lakes Harbor sediment [Fitchko, 1989]) is exceeded by the RME and average barium concentrations. These concentrations for barium fall within the range of "heavily polluted" sediments. metals represent lowest effect levels (LELs).

Notes:

µg/g = micrograms per gram NA = Not available

O-4 ECOLOGICAL RISK CALCULATIONS FOR NON-CPCs SUPPORTING INFORMATION

Estimated Chronic Exposure to Terrestrial Receptors from Ingestion of RME Concentrations of Chemicals Eliminated as CPCs in Food and Surface Soil Table 0-4...

Area 2 Upland Remedial Investigation Report, AOC 57 Devens, Massachusetts

EXPOSURE CON	EXPOSURE CONCENTRATION DATA
	RME
ANALYTE	CONCENTRATION
	(mg/kg)
Aluminum	7.5E+03
Barium	4.1E+01
Beryllium	7.1B-01
Chromium	2.7B+01
Lead	2.3B+01
Vanadium	1.6B+01
Zinc	3.8B+01

ESTIMATED CONTAMINANT CONCENTRATIONS

BAF VALUES FOR

IN PRIMARY FOOD ITEMS	OOD ITEMS			OTHER FOOD ITEMS	
Co Invert Inver RAFF31	Concentration in Invert Invertebrate Tissue[b]	Plan BAF(a)	Concentration in Plant Tissue [c] (me/ke)	Small Mammal BAF(a) E	Sm Bi
7.5B-02	5.6B+02	8.0B04	6.0B+00		'
7.5B-03	3.1B-01	3.0B-02	1.2B+00	7.5E-03	•
5.0压-02	3.5E-02	2.0B-03	1.4B-03	5.0E-02	••
1.6E-01	4.3E+00	1.5B-03	4.1B-02	2.8E-01	•
7.8E-02	1.8E+00	9.0B-03	2.1B-01	1.5B-02	•
1.3B-01	2.0E+00	1.1B-03	1.7B-02	1.2B-01	•
1.8E+00	6.9B+01	6.1B-01	2.3B+01	2.1E+00	•

7.5B-03

7.SB-02 Bird BAF[a] Small

5.0B-02 2.8B-01 1.5B-02 1.2B-01 2.1B+00

CPC = Contaminant of Potential Concern [a] Bioaccumulation data presented in:

Appendix O-1, Table O-1.2

[b] CPC concentration s in invertebrate tissue equals the invertebrate BAR multiplied by the RMB soil concentration of the CPC. [c] CPC concentrations in plant tissue equals the plant BAR multiplied by the RMB soil concentration of the CPC.

Estimated Chronic Exposure to Terrestrial Receptors from Ingestion of RME Concentrations of Chemicals Eliminated as CPCs in Food and Surface Soil Remedial Investigation Report, AOC 57 Devens, Massachusetts Area 2 Upland Table 0-4.1

POTENTIAL DIETARY EXPOSURE (mg/kgBW/day) [d]

ANALYTE	White-footed mouse	American robin	Red fox	Barred owl	
Aluminum	2.6E+01	1.0E+02	5.2E-03	2.6B-02	
Barium	2.4E-01	5.2E-01	2.1E-05	1.2E-04	
Beryllium	2.3E-03	8.9E-03	4.4E-07	2.3E-06	
Chromium	1.2E-01	4.4E-01	2.9E-05	1.4E-04	
Lead	1.0E-01	3.2E-01	1.6E-05	7.1E-05	
Vanadium	6.4E-02	2.4E-01	1.4E-05	6.0E-05	
Zinc	3.4E+00	4.3E+00	8.5E-04	5.8E-03	

[d] Calculated by summing the products of individual prey type concentrations and percent in diet, multiplying by the ingestion rate, and dividing by body weight (Table 9-27).



Area 2 Upland Table 0-4.

Exposure Parameters and Assumptions for Terrestrial Receptors [e] Remedial Investigation Report, AOC 57 Devens, Massachusetts

ight	 -	11	4.69	0.72	
Body Weight (kg)	0.0	0.077	4,	ö	
	946	111	.24	0.047	
Food Ingestion Rate (kg/day)	0.0	0,011	0	0.0	
F Ingo R (kg					
	0	0	4	4	
Site Foraging Frequency [g]	1.00E+00	1.00E+00	2.90E-04	8.85B-04	
Site Foraging Frequency [g]		ቭ	7	80	
l) aa	~	0.75	7	٣	
ED					
	0.147	0.48	1,727	565	
Range (acres)					
Home Range (acres)					
<u>4</u>					
	2%	10%	3%	2%	
Soil					
Small Birds	%0	%0	10%	12%	
	٠.				
Percent Prey in Diet 			•		
nt Pres					
- Perce Il	%0	%0	57%	80%	
Per Small Mammals					
1 20	88%	57%	10%	%0	
Inverts Plants					
11.8	10%	33%	20%	3%	
Inve	1	'n		,,,	
	al)		(Predatory mammal)	ਰ	
	mamma	bird)	ory ma	ory bire	
	(Herb. mammal)	(Omn. bird)	Predat	(Predatory bird)	
		_	_	•	
tative fe	эгло				
Representative Wildlife Species	oted m	robin		4	
Re	White - footed mouse	American robin	Red fox	Barred owl	
	W	An	Re	Bal	

NOTES

0.5 acres SITE AREA: Appendix O-1, Table O-1.1 [e] Documentation of exposure parameters presented in:

[f] BD = Exposure Duration (percentage of year receptor is expected to be found at study area). BD is assumed to be 1 for this risk assessment. [g] SFR = Site Foraging Frequency (calculated by dividing site area by receptor home range (cannot exceed 1.0)).

Estimated Chronic Exposure to Terrestrial Receptors from Ingestion of RME Concentrations of Chemicals Eliminated as CPCs in Food and Surface Soil Table 0-4.2

Area 2 Floodplain

Remedial Investigation Report, AOC 57 Devens, Massachusetts

EXPOSURE CONCENTRATION DATA

1.0E+00 2.3B-01 1.3E-01

ESTIMATED CONTAMINANT CONCENTRATIONS

BAF VALUES FOR

	Concentration in Plant Tissue [c] (mg/kg)	4.9E+00	1.4E-03	2.3B-02
	Plant BAF[a]	8.0度-04	2.035-03	1.5B-03
PRIMARY FOOD LIEMS	Concentration in fivertebrate Tissue [b] (mg/kg)	4.6B+02	3.5E-02	2.5E+00
FRIMAKY	finyert Inv. BAF[a]	7.5B-02	5.0B-02	1.6B-01

. are	Small	Bird	BAF[a]	7.5E-02	5.0因一02	2.8B-01	1.0E+00	3.0B-01	1.2B-01								
OTHER BOOD PUBLIC	Small	Mannal	BAF[a]	7.5B02	5.0B-02	2.8B-01	1.0E+00	3.0E-01	1.2B-01			ú					
	Concentration in	Plant Tissue [o]	(mg/kg)	4.9B+00	1.4E-03	2.3压-02	9.2B-03	1.2B-01	1.5B-02								
I FAMILIA COLOTALISME		Plant	BAF[a]	8.0B-04	2.0B-03	1.5B-03	4.0B-03	1.2B-02	1.1B-03								
I AMBUMAL CO.	JD II EMS	brate Tissue [b]	(mg/kg)	4.6B+02	3.5E-02	2.5B+00	2.3E+00	2.4E+00	1.8E+00								

CPC = Contaminant of Potential Concern [a] Bioaccumulation data presented in:

Appendix O-1, Table O-1.2

[b] CPC concentration s in invertebrate tissue equals the invertebrate BAF multiplied by the RMB soil concentration of the CPC. [c] CPC concentrations in plant tissue equals the plant BAF multiplied by the RMB soil concentration of the CPC.

Table 0-4.2

Estimated Chronic Exposure to Terrestrial Receptors from Ingestion of RME Concentrations of Chemicals Eliminated as CPCs in Food and Surface Soil Area 2 Floodplain

Remedial Investigation Report, AOC 57

Devens, Massachusetts

POTENTIAL DIBTARY EXPOSURE (mg/kgBW/day) [d]

							·		
	Me								
	Short-tailed shrew	-01	.03	10	.02	.01	.01		
	Short-t	4.3B+01	4.4B-03	1.5B-01	8.9B-02	1.3B-01	1.2B-01		
								٠	
	towi	-02	-00	-05	-05	-05	-05		
	Barred owl	1.2B-02	1.3B-06	3.7B-05	2.1B-05	2.8B-05	2.9B-05		
		02	90	05	05	05	05		
	Raccoon	2.6B-02	2.9B-06	7.5B-05	2.6B-05	5.8B-05	6.4B-05		
	Race								
	говіп	-01	-03	-01	-02	-01	-01		
	American robin	5.2B+	5.6B-03	1.6B-	6.7B-	1.3B-	1.3B-		
٦									
SW/day)	White-footed mouse	2.1B+01	2.3B-03	7.0B-02	3.5B-02	6.8B-02	5.8B-02		
RE (mg/kg	Vhita-foc	2	7	7	e	۰	'n		
EXPOSU	-								
POTENTIAL DIETARY EXPOSURE (mg/kgBW/day) [d]									
TIAL DI	YTB	nm	E	шn			um		
POTEN	ANALYTB	Aluminum	Beryllium	Chromium	Cobalt	Nickel	Vanadium		····

[d] Calculated by summing the products of individual prey type concentrations and percent in diet, multiplying by the ingestion rate, and dividing by body weight (Table 9-27).

Exposure Parameters and Assumptions for Terrestrial Receptors [e] Area 2 Floodplain Remedial Investigation Report, AOC 57 Devens, Massachusetts Table 0-4.2

Wildlife	Г	Inverts PI	Plants S	Small Manmals	Small :	Small Soil (auce) (auce) (auce) (auce)		ED [t] F	Frequency [g]	Rate (ke/day)	(kg)
	(Herb. mammal)	10%	88%		%0	2%	0.147	1	1.00B+00	0.0049	0.040
American robin (C	(Omn. bird)	33%	57%	%0	%0	10%	0.48	0.75	6.25E-01	0.011	0.077
	Predatory mammal)	14%	26%	19%	2%	%6	385	г	7.79B04	0.214	3.99
Į,	(Predatory bird)	3%	%0	80%	12%	2%	565	1	5.31E-04	0.047	0.72
d shrew	(Omn. mammal)	78%	12%	%0	%0	10%	0.96		3.12B-01	0.0024	0.017

[e] Documentation of exposure parameters presented in:

Appendix O-1, Table O-1.1

[f] BD = Bxposure Duration (percentage of year receptor is expected to be found at study area). BD is assumed to be 1 for this risk assessment.

[g] SFF = Site Foraging Frequency (calculated by dividing site area by receptor home range (cannot exceed 1.0)).

Estimated Chronic Exposure to Terrestrial Receptors from Ingestion of RME Concentrations of Chemicals Eliminated as CPCs in Food and Surface Soil Table 0-4

BAF VALUES FOR

ESTIMATED CONTAMINANT CONCENTRATIONS

3.0E-02 1.5B-03 4.0B-03 7.8B-01 9.0E-03 1.2B-02

8.0B-04

BAF[a]

nvertebrate Tissue[b] Concentration in

Remedial Investigation Report, AOC 57 Devens, Massachusetts Area 3

EXPOSURE CONCENTRATION DATA	NTRATION DATA	INI	IN PRIMARY FOOD ITEMS	FOOD ITEMS
	RME		Con	Concentration in
ANALYTE	CONCENTRATION		Invert Inverte	Invertebrate Tissue [4
	(tng/kg)	B	BAF[a]	(mg/kg)
Aluminum	7.1B+03	7	7.5E-02	5.3B+02
Barium	2.9B+01	7	7.5E-03	2.2B-01
Chromium	1.2B+01		1.6B-01	1.9B+00
Cobalt	3.2E+00		1.0E+00	3.2B+00
Copper	6.8B+00		1.6B-01	1.1E+00
Lead	3.3B+01	7	7.8B-02	2.6B+00
Nickel	1.1E+01	- 7	2.3B-01	2.6E+00
Vanadium	9.4B+00		1.3B-01	1.2B+00
Zinc	2.8B+01	<u></u>	1.8B+00	5.1E+01
				

Appendix O-1, Table O-1.2 CPC = Contaminant of Potential Concern

[a] Bioaccumulation data presented in:

[b] CPC concentration s in invertebrate tissue equals the invertebrate BAF multiplied by the RMB soil concentration of the CPC. [c] CPC concentrations in plant tissue equals the plant BAF multiplied by the RMB soil concentration of the CPC.

3.0E-01 1.2E-01 2.1B+00 1.0B+00 7.5B-02 7.5B-03 2.8B-01 6.0E-01 1.SB-02 BAFIA Bird OTHER FOOD ITEMS Mammal BAF[a] Small 7.5B-02 7.5B-03 2.8E-01 1.0B+00 6.0E-01 1.5E-02 3.0B--01 1.2E-01 2.1B+00 5.3B+00 1.0E-02 1.3E-01 1.7B+01 8.8B-01 1.8B-02 1.3E-02 2.9E-01 5.7E+00 Concentration in Plant Tissue [c] (mg/kg)

> 1.1E-03 6.1E-01

Table 0-4.3

Estimated Chronic Exposure to Terrestrial Receptors from Ingestion of RME Concentrations of Chemicals Eliminated as CPCs in Food and Surface Soil Area 3

Remedial Investigation Report, AOC 57 Devens, Massachusetts

POTENTIAL DIETARY EXPOSURE (mg/kgBW/dav) [d]

Barred owl	9.2E-03	3.4E-05	2.0E-05	2.1E-05	7.7E-05	4.0E-05	2.1E-05	1.3E-05	1.2E-03
Red fox	2.0E-03	6.0E-06	4.8E-06	6.0E-06	1.6E-05	9.1E-06	5.8E-06	3.3E-06	2.4E-04
American robin	4.0E+01	1.6E-01	8.0E-02	6.2E-02	1.8E-01	1.9E-01	9.1E-02	6.0E-02	1.3E+00
ANALYTE White-footed mouse An	2.5E+01	1.7E-01	5.3E-02	4.8E-02	6.0E-01	1.4E-01	7.3E-02	3.9E-02	2.6E+00
ANALYTE	Aluminum	Barium	Chromium	Cobalt	Copper	Lead	Nickel	Vanadium	Zinc

[d] Calculated by summing the products of individual prey type concentrations and percent in diet, multiplying by the ingestion rate, and dividing by body weight (Table 9-27).



Table O-4.3
Exposure Parameters and Assumptions for Terrestrial Receptors [e]
Area 3
Remedial Investigation Report, AOC 57
Devens, Massachusetts

Body Weight (kg)	0.040	7.000	4.69	0.72	
Body			**	_	
Food Ingestion Rate (kg/day)	0.0049	0.011	0.24	0.047	
Fige Tinge R: (kg/					
ting / [E]	+00	01	-04	-04	
Site Foraging Frequency [g]	1.00E+00	4.17B-01	1.16B-04	3.54B-04	
; ED [t]	н	0.75	н	-	
ED	7	20	7		••
ge s)	0.147	0.48	1,727	565	
Home Range (acres)					
[88888]					
Small Soil Birds	2%	10%	3%	2%	
Small Soil Birds	%0	%0	10%	12%	
£0000000000000000000000000000000000000					,
- Percent Prey in Diet il					
rcent Pre					
Per Small Mammals	%0	%0	57%	80%	
1 2	88%	57%	10%	%0	
inverts Plants					
Inverts	10%	33%	20%	3%	
T. Tu			mal)		
	(Herb. mammal)	ird)	Predatory mammal)	(Predatory bird)	
	(Herb. r	(Omn. bird)	(Predate	(Predate	
, re	6 7				
Representative Wildlife Species	snom pə,	njq			
Repr V S	White -footed mouse	American robin	Red fox	Barred owl	
	Wh	Am	Rec	Bar	

	PEA.
NOTES	STTP

0.2 acres

[f] BD = Bxposure Duration (percentage of year receptor is expected to be found at study area). BD is assumed to be 1 for this risk assessment. [g] SFR = Site Foraging Frequency (calculated by dividing site area by receptor home range (cannot exceed 1.0)). Appendix O-1, Table O-1.1 [e] Documentation of exposure parameters presented in:

Estimated Chronic Exposure to Semi - Aquatic Receptors from Ingestion of RME Concentrations of Chemicals Eliminated as CPCs in Food and Sediment Table O-Area 2

Remedial Investigation Report, AOC 57 Devens, Massachusetts

EXPOSURE CONCENTRATION DATA

EXPOSURE CONCENTRATION DATA			BSTIMA	TED TISSUE	ESTIMATED TISSUE LEVELS IN PRIMARY PREY ITEMS	RIMA	AY PRBY II	EMS
	RME SEDIMENT	RME UNFILT. SURFACE WATER	Aquatic	. Aquatic	Aq. Org. Tissue Aquatic		Raccoon Tissue	Her. Tissi
CHEMICAL	CONCENTRATION	CONCENTRATION (meL)	Organism BCF [a]				Exposure (mg/kg)	Expos (mg/)
Садтічт	2.3E+00	Not a CPC	NA		1		3.2E+00	3.2E
Vanadium	4.0B+01	Not a CPC	NA	1.3B-01	5.2E+00 1.1E-03	-03	5.2E+00	5.2B
***			-					
			-					
				.*				
•								

Brposure 3.2E+00 Tissue (mg/kg) 5.2B+00 Heron 5.2E+00 3.2E+00 Exposure BAF[a] (mg/kg) BAF[a] (mg/kg) Raccoon Tissue 1.4B+00 3.2B+00 4.1B-01 1.3E-01 5.2E+00 1.1E-03 Plant Tissue Aquatic Aq. Org. Level Organism Aquatic

Appendix O, Tables O-1.2 and O-1.3 BARs are multiplied by sediment concentrations and BCRs are multiplied by the surface water concentrations; BCFs <300 were not used as per USBPA (1989). The aquatic organism tissue level is equal to the greater of the two products. [a] Bioaccumulation data presented in:

[b] Measured crayfish and fish tissue concentrations (provided in Table O-1.3).

Table 0-4.4 Estimated Chronic Exposure to Semi-Aquatic Receptors from Ingestion of RME Concentrations of Chemicals Eliminated as CPCs in Food and Sediment Area 2

Remedial Investigation Report, AOC 57 Devens, Massachusetts

POTENTIAL DIETARY HXPOSURE (mg/kgBW-day) [c]	OSURE (mg/kgBW	'day) [c]			
CHEMICAL	Muskræ	Mallard		Raccoon	Great blue heron
Cadmium Vanadium		8.6B-02 3.0B-01	1.6E-04 1.5B-04	3.1B-04 8.2B-04	1.3B-01 2.5B-01

[c] Calculated by summing the products of individual prey type concentrations and percent in diet with surface water and sediment exposures, multiplying by the exposure duration, SFF and ingestion rate, and dividing by body weight (Table 9-27).

Table 0-4.4 Exposure Parameters and Assumptions for Semi-Aquatic Receptors Area 2

Remedial Investigation Report, AOC 57 Devens, Massachusetts

EXPOSURE PARAMETERS [d]										
Indicator Species	Aquate Organisms	Diet		Home Range Sediment (acres)	tange BD [e] s)		Site Foreging Frequency [f]	Dietary Wa Ingestion Inges Rate Ra (kg/day) (L/d	Water B Ingestion We Rate (f. (1./day)	Body Weight (kg)
Muskrat	(Small herb. mammal)	10%	80%	10%	0.2	7	1.00B+00	0.084	0.12	1.27
Mallard	(Small herb. bird)	1%	%16	2%	235	7	2.98B-03	0.063	0.064	1.134
Raccoon	(Predatory mammal)	91%	%0	%6	385	+-1	1.82B-03	0.214	0.344	3.99
Great blue heron	(Piscivorous bird)	98%	0 %	2%	1.5	0.5	4.67B-01	0.401	0.101	2.23

NOTES:

Appendix O, Table O-1.1

[d] Documentation of exposure parameters presented in: [e] BD = Exposure Duration (percentage of year receptor is expected to be found at study area)

[f] SFF = Site Foraging Frequency (calculated by dividing site area by receptor home range (cannot exceed 1.0))

0.7 acres SITE AREA:

Estimated Chronic Exposure to Semi-Aquatic Receptors from Ingestion of RME Concentrations of Chemicals Eliminated as CPCs in Food, Surface Water, and Sediment Table 0 - 4.3 Area 3

Remedial Investigation Report, AOC 57 Devens, Massachusetts

EXPOSURE CONCENTRATION DATA

Aque Organ BCF		_			1.7B			
RMB UNFILT. SURFACE WATER CONCENTRATION (mg/L)	Not a CPC	Not a CPC	Not a CPC	Not a CPC	9.3B-02	Not a CPC	Not a CPC	
RMB SEDIMENT SU CONCENTRATION CO (mg/kg)	3.7B+01	6.0B+01	1.1B+01	6.5E+01	4.6B+02	1.8B+00	9.1B+01	
CHEMICAL	Arsenic	Barium	Copper	Lead	Manganese	Selenium	Zinc	

BSTIMATED TISSUE LEVELS IN PRIMARY PREY ITEMS

000000	355553	900000	334									
		u	<u> </u>	5 .	01	8	8	02	00	02		
Raccoon	Tissue	Exposure	(mg/kg)	7.45.	4.5E-01	1.8B+00	5.0E+00	1.6B+02	1.4B+00	1.6B+02		
Ra	F	ΕĒ	B '	4	4	П	5	1	Н	, , i		
	일	12	<u>.</u>	7	9	-02	-02	10	-01	10		
	Aquatic	Plant	BAFT	70-aus	2.5B-02	6.0E-02	5.6B-02	1.3E-01	1.6B-01	9.2B-01		
git,			ᅠ .									
Aq. Org	Tissue	Level	(mg/kg)	2.4B - UI	4.5B-01	1.8B+00	5.0E+00	1.6E+02	1.4E+00	1.6B+02		
•				. •							$\label{eq:constraints} \mathcal{L}(x,y) = \mathcal{L}(x,y) + \mathcal{L}(y)$	
	Aquatic	Organism	BAF	0.0E-U3	7.5B-03	1.6B-01	7.8B-02	2.0E-02	7.6B÷01	1.8E+00		
	Ą	Q	BA (ö	7.	ä	7.5	2.(7.0	1.5		
	,g	ij	;	Y.	ΝĀ	NA	Ϋ́	-03	NA	NA		
	Aquatic	Organism	BCF					1.7B+03				
	•	Ö										
torrio	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,											
	~	Z.		7	PC	PC	PC	-02	PC	æc		

Appendix O, Tables O-1.2 and O-1.3 BAFs are multiplied by sediment concentrations and BCFs are multiplied by the surface water concentrations; BCFs <300 were not used as per USEPA (1989). The aquatic organism tissue level is equal to the greater of the two products. [a] Bioaccumulation data presented in:

[b] Measured crayfish and fish tissue concentrations (provided in Table O-1.3).

Table O-4.5 Estimated Chronic Exposure to Semi-Aquatic Receptors from Ingestion of RME Concentrations of Chemicals Eliminated as CPCs in Food, Surface Water, and Sediment Area 3

Remedial Investigation Report, AOC 57 Devens, Massachusetts

POTENTIAL DIBTARY BXPOSURB (mg/kgBW-day) [c]

[c] Calculated by summing the products of individual prey type concentrations and percent in diet with surface water and sediment exposures, multiplying by the exposure duration, SFF and ingestion rate, and dividing by body weight (Table 9-27).

15-Mar-2000

a3swsdmNONCOC.wk1

Table O-4.5 Exposure Parameters and Assumptions for Semi-Aquatic Receptors Area 3

Remedial Investigation Report, AOC 57 Devens, Massachusetts

	Body Weight (kg)	3.99	
	Weij (kg		
	**********	4	
	Water Ingestion Rate (L/day)	0.344	
	Wal nges Ra (L/d		
	T		
	Dietary Ingestion Rate (kg/day)	0.214	
	Diet Ra Kg/d	0	
	I		
	øs En		
	agin icy []	-04	
	. For	.19E	
	Site	5.19E-04	
		-	
	[a] (
	18		
	Home Range BD [e] Site Foraging Sediment (actes) Frequency [f]	16	
	ange s)	385	
	acre R		
	Н°		
	nent	%6	
	Sedin		
	7		
	1		
	l l		
		%0	
	Plants		
	Ä		
	1 20	91%	
	n Di c ns		
	rey i juati anisi		
	cent Frey in Die Aquatic Organisms		
		(lal)	
		ашп	
		ry m	
Į.		dato	
RS		(Predatory mammal)	
TE			
AM			
AR	itor		
H	Indicator Species		
SUR	1 4	מי	
XPOSURE PARAMETERS [4]		<i>accoon</i>	
ΕX		Ra	

NOTES:

Appendix O, Table 0-1.1 [d] Documentation of exposure parameters presented in:

[e] m ED = Exposure Duration (percentage of year receptor is expected to be found at study area)

[f] SFF = Site Foraging Frequency (calculated by dividing site area by receptor home range (cannot exceed 1.0))

0.2 acres SITE AREA:

Risk of Lethal or Sublethal Effects for Terrestrial Receptors from RME Concentrations of Chemicals Eliminated as CPCs in Food and Surface Soil Table 0-4.6

Area 2 Upland Remedial Investigation Report, AOC 57 Devens, Massachusetts

ANTA-TANTE	1	White-footed mouse	1 morres	A	American robin	in	Ŗ	Red fox	
ANALITE	PDE	RTV	OH OH	PDE	RIV	HQ	PDE	RTV	НО
Aluminum	2.6E+01	4.3E+02	6.1E-02	1.0E+02	4.3E+02	2.4E-01	5.2E-03	4.3E+02	1.2E-05
Barium	2.4E-01	2.0E+02	1.2E-03	5.2E-01	2.0E+02	2.6E-03	2.1E-05	2.0E+02	1.1E-07
Beryllium	2.3E-03	8.5E-01	2.7E-03	8.9E-03	8.5E-01	1.1E-02	4.4E-07	8.5E-01	5.1E-07
Chromium	1.2E-01	3.5E+00	3.5E-02	4.4E-01	2.5E+01	1.8E-02	2.9E-05	3.5E+00	8.2E-06
Lead	1.0E-01	2.5E+00	4.0E-02	3.2E01	7.5E+01	4.3E-03	1.6E-05	2.5E+00	6.4E-06
Vanadium	6.4E-02	6.0E+00	1.1E-02	2.4E-01	1.1E+01	2.2E-02	1.4E05	6.0E+00	2.3E-06
Zinc	3.4E+00	2.0E+02	1.7E-02	4.3E+00	2.0E+02	2.1E-02	8.5E-04	2.0E+02	4.2E-06
				٠					
	,								
							٠		
				*		···			
							•		
								,	
				-					
SUMMARY HAZARD INDEX			1.7E-01			3.2B-01			3.4E-05
PDE = Potential Dietary Exposure (mg/kgBW/day)		RTV = Reference Toxicity Value (mg/kgBW/day)	Toxicity Value (1	ng/kgBW/day)	H) = Hazard Qu	otient (calculated	HQ = Hazard Quotient (calculated by dividing PDE by RTV)	3 by RTV)

Risk of Lethal or Sublethal Effects for Terrestrial Receptors from RME Concentrations of Chemicals Eliminated as CPCs in Food and Surface Soil Area 2 Upland
Remedial Investigation Report, AOC 57
Devens, Massachusetts Table 0-4.6

Publ: RIV				
PDB RTV 1.2B-04 4.3B+02 1.2B-04 2.0B+02 2.3B-06 8.5B-01 1.4B-04 2.5B+01 7.1B-05 7.5B+01 6.0B-05 1.1B+01 5.8B-03 2.0B+02	ANALYTE	8	arredowl	
m 1.2E-04 2.0E+02 1.2E-04 2.0E+02 2.3E-06 8.5E-01 1.4E-04 2.5E+01 7.1E-05 7.5E+01 6.0E-05 1.1E+01 5.8E-03 2.0E+02		PDE	RIV	НО
1.2E-04 2.0E+02 2.3E-06 8.5E-01 1.4E-04 2.5E+01 7.1B-05 7.5E+01 6.0E-05 1.1E+01 5.8E-03 2.0E+02	Aluminum	2.6E-02	4.3E+02	6.1E-05
itim 2.3E-06 8.5E-01 itim 1.4E-04 2.5E+01 7.1B-05 7.5E+01 6.0E-05 1.1E+01 5.8E-03 2.0E+02	Barium	1.2E-04	2.0E+02	6.1E-07
1.4E-04 2.5E+01 7.1B-05 7.5E+01 6.0E-05 1.1E+01 5.8E-03 2.0E+02	Beryllium	2.3E-06	8.5E-01	2.7E-06
7.1E-05 7.5E+01 6.0E-05 1.1E+01 5.8E-03 2.0E+02	Chromium	1.4E-04	2.5E+01	5.5E-06
6.0E-05 1.1B+01 5.8E-03 2.0E+02	Lead	7.1E-05	7.5E+01	9.5E-07
5.8E-03 2.0E+02	Vanadium	6.0E-05	1.1E+01	5.5E-06
	Zinc	5.8E-03	2.0E+02	2.9E-05
				44 (4 · · ·
		•		
				1000000

RTV = Reference Toxicity Value (mg/kgBW/day) SUMMARY HAZARD INDEX
PDE = Potential Dietary Exposure (mg/kgBW/day)



Table 0-4.7 Risk of Lethal or Sublethal Effects for Terrestrial Receptors from RME Concentrations of Chemicals Eliminated as CPCs in Food and Surface Soil Area 2 Floodplain Remedial Investigation Report, AOC 57 Devens, Massachusetts

							I		
ANALYTE	N PDE	White—footed mouse RTV HO	fmouse HO	A PDE	A merican robin RTV	in HO	A PDE	<i>Raccoon</i> RTV	HQ
Aluminum	2.1E+01	4.3E+02	5.0E-02	5.2E+01	4.3E+02	1.2E-01	2.6E-02	4.3E+02	6.2E-05
Beryllium	2.3E-03	8.5E-01	2.7E-03	5.6E-03	8.5E-01	6.6E-03	2.9E06	8.5E-01	3.4E-06
Chromium	7.0E-02	3.5E+00	2.0E-02	1.6E-01	2.5E+01	6.3E-03	7.SE-05	3.5E+00	2.1E-05
Cobalt	3.5E-02	4.2E+00	8.3E-03	6.7E-02	4.2E+00	1.6E-02	2.6E-05	4.2E+00	6.3E06
Nickel	6.8E-02	1.3E+01	5.2E-03	1.3E-01	5.0E+01	2.5E-03	5.8E-05	1.3E+01	4.5E-06
Vanadium	5.8E-02	6.0E+00	9.7E-03	1.3E-01	1.1E+01	1.2E-02	6.4E-05	6.0E+00	1.1E-05
							÷		
	****					•			
				.*					
						-			
							••		
STRACE HAZADD INDEX			9 6E-02			1.7E-01			1.1E-04
SOMBLE LINCOLD INCOME				A. P. T. T. T. T.) <u>11</u>		TI OTT		

PDE = Potential Dietary Exposure (mg/kgBW/day)

RTV = Reference Toxicity Value (mg/kgBW/day)

Risk of Lethal or Sublethal Effects for Terrestrial Receptors from RME Concentrations of Chemicals Eliminated as CPCs in Food and Surface Soil Table 0-4.7

Area 2 Floodplain Remedial Investigation Report, AOC 57 Devens, Massachusetts

ANALYTE	B	Barredowl		S	Short-tailed shrew	shrew
} ; ; ; ;	PDE	RIV	HQ	PDE	RIV	HQ
Aluminum	1.2E-02	4.3E+02	2.8E05	4.3B+01	4.3E+02	1.0E-01
Beryllium	1.3E-06	8.5E-01	1.5E-06	4.4E-03	8.5E-01	5.1E-03
Chromium	3.7E-05	2.5E+01	1.5E-06	1.5E-01	3.5E+00	4.4E-02
Cobalt	2.1E-05	4.2E+00	5.0E-06	8.9E-02	4.2E+00	2.1E-02
Nickel	2.8E-05	5.0E+01	5.5E-07	1.3E-01	1.3E+01	9.9E-03
Vanadium	2.9E-05	1.1E+01	2.6E-06	1.2E-01	6.0E+00	2.1E-02
			,			

HQ = Hazard Quotient (calculated by dividing P

2.0E-01

SUMMARY HAZARD INDEX
PDE = Potential Dietary Exposure (mg/kgBW/day)

RTV = Reference Toxicity Value (mg/kgBW/day)

3.9E-05

fpssmaxNOI

Table O-4.8 Risk of Lethal or Sublethal Effects for Terrestrial Receptors from RME Concentrations of Chemicals Eliminated as CPCs in Food and Surface Soil Area 3

Remedial Investigation Report, AOC 57 Devens, Massachusetts

ANALYTE	PDF	White-footed mouse RTV HO	# mouse HO	A PDE	American robin RTV	in HO	<i>R</i> PDE	RIV	HQ
Aluminum	2.5E+01	4.3E+02	5.8E-02	4.0E+01	4.3E+02	9.3E-02	2.0E-03	4.3E+02	4.6E-06
Barium	1.7E-01	2.0E+02	8.5E-04	1.6E-01	2.0E+02	7.9E-04	6.0E-06	2.0E+02	3.0E-08
Chromium	5.3E-02	3.5E+00	1.5E-02	8.0E-02	2.5E+01	3.2E-03	4.8E-06	3.5E+00	1.4E-06
Cobalt	4.8E-02	4.2E+00	1.2E-02	6.2E-02	4.2E+00	1.5E-02	6.0E-06	4.2E+00	1.4E-06
Copper	6.0E-01	1.0E+02	6.0E-03	1.8E-01	1.0E+02	1.8E-03	1.6E-05	1.0E+02	1.6E-07
Lead	1.4E-01	2.5E+00	5.7E-02	1.9E-01	7.5E+01	2.5E-03	9.1E-06	2.5E+00	3.6E-06
Nickel	7.3E-02	1.3E+01	5.6E-03	9.1E-02	5.0E+01	1.8E-03	5.8E-06	1.3E+01	4.5E-07
Vanadium	3.9E-02	6.0E+00	6.5E-03	6.0E-02	1.1E+01	5.5E-03	3.3E-06	6.0E+00	5.5E-07
Zinc	2.6E+00	2.0E+02	1.3E-02	1.3E+00	2.0E+02	6.6E-03	2.4E-04	2.0E+02	1.2E-06
SUMMARY HAZARD INDEX			1.7E-01			1.3B-01			1.3B-05
PDE = Potential Dietary Exposure (mg/kgBW/day)		RTV = Reference Toxicity Value (mg/kgBW/day)	Toxicity Value (1	ng/kgBW/day)	H	Q = Hazard Ot	HQ = Hazard Quotient (calculated by dividing PDE by RTV)	d by dividing PD	E by RTV)

PDE = Potential Dietary Exposure (mg/kgBW/day)

KIV = Reference Toxicity Value (mg/kgb W/day)

Table O-4.8

Risk of Lethal or Sublethal Effects for Terrestrial Receptors from RME Concentrations of Chemicals Eliminated as CPCs in Food and Surface Soil Area 3

Remedial Investigation Report, AOC 57 Devens, Massachusetts

Barred owl	PDE RTV	9.2E-03 4.3E+02	3.4E-05 2.0E+02	2.0E-05 2.5E+01	2.1E-05 4.2E+00	7.7E-05 1.0E+02	4.0E-05 7.5E+01	2.1E-05 5.0E+01		1.2E-03 2.0E+02
ANALYTE		Aluminum	Barium	Chromium	Cobalt	Copper	Lead	Nickel	Vanadium	Zinc

RTV = Reference Toxicity Value (mg/kgBW/day) PDE = Potential Dietary Exposure (mg/kgBW/day) SUMMARY HAZARD INDEX



Table O-4.9 Risk of Lethal or Sublethal Effects for Semi-Aquatic Receptors from RME Concentrations of Chemicals Eliminated as CPCs in Food and Sediment Area 2

Remedial Investigation Report, AOC 57 Devens, Massachusetts

HQ	1.4E-05					1.5E-04
Raccoon RTV	2.2E+01 6.0E+00					
A	3.1E-04 8.2E-04		•			
HQ	1.6E-05 1.4E-05					3.0B-05
Mallard RTV	1.0E+01 1.1E+01					
PDE	1.6E-04 1.5E-04	4 j. 14		٠.		
НО	4.0E-03 5.1E-02					5.5E-02
Muskrat RTV	2.2E+01 6.0E+00					
) Edd	8.6E-02 3.0E-01					
	·	-700.				JEX
F.						SUMMARY HAZARD INDEX
CHEMICAL	Cadmium Vanadium					SUMMAR

 $\label{eq:pde} PDE = Potential\ Dietary\ Exposure\ (mg/kgBW-day).$

RTV = Reference Toxicity Value (mg/kgBW-day)

Table O-4.9
Risk of Lethal or Sublethal Effects for Semi-Aquatic Receptors from RME Concentrations of Chemicals Eliminated as CPCs in Food and Sediment
Area 2

Remedial Investigation Report, AOC 57 Devens, Massachusetts

ron	1.3E-02	2.3E-02	 			3.6E-02
Great blue heron	1.0E+01	1.1E+01				The state of the s
	1.3E-01	2.5E-01				
CHEMICAL	Cadmium	Vanadium				SUMMARY HAZARD INDEX

RTV = Reference Toxicity Value (mg/kgBW-day)

PDE = Potential Dietary Exposure (mg/kgBW-day).

Risk of Lethal or Sublethal Effects for Semi-Aquatic Receptors from RME Concentrations of CPCs in Food, Surface Water, and Sediment Area 3

Remedial Investigation Report, AOC 57 Devens, Massachusetts

Arsenic 9.9B-05 Bartum 1.6B-04 Copper 7.4B-05 Lead 2.9B-04 Manganese 2.9B-04 Selenium 3.9B-05 Zinc 4.4B-03	5.8B-01 2.0B+02 1.0B+02 2.5B+00 4.5B+01 2.0B-01 2.0B+02	1.7B-04 8.1B-07 7.4B-07 1.2B-04 1.1B-04 2.0B-04 2.2B-05
V So	5.8B-01 2.0B+02 1.0B+02 2.5B+00 4.5B+01 2.0B-01 2.0B+02	1.7B-04 8.1B-07 7.4B-07 1.2B-04 1.1B-04 2.0B-04 2.2B-05
V 50 E	2.0B+02 1.0B+02 2.5B+00 4.5B+01 2.0B-01 2.0B+02	8.1B-07 7.4B-07 1.2B-04 1.1B-04 2.0B-04 2.2B-05
0 0	1.0B+02 2.5B+00 4.5B+01 2.0B-01 2.0B+02	7.4B-07 1.2B-04 1.1B-04 2.0B-04 2.2B-05
99 E	2.5B+00 4.5B+01 2.0B-01 2.0B+02	1.2B-04 1.1B-04 2.0B-04 2.2B-05
jum ium	4.5B+01 2.0B-01 2.0B+02	1.1B-04 2.0B-04 2.2B-05
m nj	2.0B-01 2.0B+02	2.2B-05
	2.0B+02	2.2B-05

PDB = Potential Dietary Exposure (mg/kgBW-day).

RTV = Reference Toxicity Value (mg/kgBW-day)

O-5 STATISTICAL ANALYSIS OF TOXICITY TESTING (MIDGE GROWTH)

Table O-5.1 Midge Growth - Copper

Location	X	Υ
57D-95-04X	201	1.36
57D-95-05X	33.8	2
57D-95-06X	42.3	1.8
57D-95-07X	36.1	2.27
57D-95-08X	33.4	1.81
57D-95-10X	34.2	1.75

Regression Output:

2.0496496
0.2137037
0.595026
6
4

X Coefficient(s) -0.003435 Std Err of Coef. 0.0014167

Table O-5.2 Midge Growth - Lead

Location	Х	Υ
57D-95-04X	410	1.36
57D-95-05X	188	2
57D-95-06X	281	1.8
57D-95-07X	170	2.27
57D-95-08X	223	1.81
57D-95-10X	170	1.75

Regression Output:

Constant		2.4679626
Std Err of Y Est	•	0.1917392
R Squared		0.6739945
No. of Observations		6
Degrees of Freedom		4

X Coefficient(s) -0.002648
Std Err of Coef. 0.0009207

Table 0-5.3 Midge Growth - TPH Diesel Fraction

Location	Х	Υ
57D-95-04X	169	1.36
57D-95-05X	52.5	2
57D-95-06X	62.1	1.8
57D-95-07X	114	2.27
57D-95-08X	51.4	1.81
57D-95-10X	4	1.75

Regression Output:

Constant	1.9420641
Std Err of Y Est	0.3223102
R Squared	0.0788058
No. of Observations	6
Degrees of Freedom	. 4

X Coefficient(s) -0.001462 Std Err of Coef. 0.0024996 ECOLOGICAL SURVEY

Harding Lawson Associates

APPENDIX P

STUDY AREA AOC 57 ECOLOGICAL SURVEY

Baseline Ecological Risk Assessment Fort Devens, Massachusetts

INTRODUCTION:

The following is a summary of the Ecological survey of the terrestrial and wetland habitats associated with AOC 57, which took place on October 13, 1995. The terrestrial and wetland habitats along Cold Spring Brook were characterized into major habitat types, through the qualitative analysis of plant species, microtopography, and hydrology. Individual site descriptions and plant species lists are provided below.

SITE DESCRIPTION

A qualitative line transect survey was utilized to characterize the upland and wetland habitats associated with the AOC 57 along Cold Spring Brook. Three transects were established perpendicular to a base line running in an east-north easterly direction along Cold Spring Brook. The following descriptions of each habitat encountered along the transects progress from the south side of the brook to the north side of the brook.

Transect 1:

Transect 1 was established perpendicular to the stream channel, approximately 300 feet to the southwest (upstream) of the AOC 57 containment berm.

Habitat A:

The first habitat encountered was a well established upland forest, co-dominated by white pines (Pinus strobus) and white and red oaks (Quercus alba and rubra). The canopy was approximately 60 feet high, with 85 percent aerial coverage. The shrub subcanopy was open, with sparse beech (Fagus grandifolia) and white pine saplings, intermixed with an 80/20 mix of lowbush and highbush blueberry shrubs (Vaccinium corymbosum and angustifolium). Other saplings present in this habitat included sparse red and white oak saplings. The herbaceous species that dominated this habitat included gold thread (Coptis groenlandica). Also common along the downslope transitional area between this habitat and habitat B were, partridge berry (Mitchella repens), interrupted fern (Osmunda claytoniana), cinnamon fern (Osmunda cinnamomea), and lady fern (Athyrium filix-femina). Additionally, the ground was covered with a mat of pine needles and semi-decomposed oak leaves. The ground surface slopes steeply towards the brook (approximately a 45 degree angle. Due to the steep slope and elevation above the brook (approximately 20 feet), surface water would never be present in this habitat.

Habitat B:

The next habitat encountered along transect 1, was a scrub/shrub marsh, approximately 30 feet wide. Trees in this habitat included a few red maples (*Acer rubrum*) and white pines, with red maple being the more dominant. The trees ranged from 30 to 45 feet tall, and the canopy was

largely open. This area also contained sparse standing dead trees. The shrubs in this area included arrow-wood (Viburnum recognitum), highbush blueberry (Vaccinium corymbosum), sweet gale (Myrica gale), winterberry (Ilex verticillata), sheep laurel (Kalmia angustifolium), speckled alder (Alnus rugosa), and red choke cherry (Prunus virginiana). Highbush blueberry and winterberry shared dominance in this habitat. The dominant herbaceous species present in this habitat included cinnamon fern, tussock sedge (Carex stricta), and sphagnum (Sphagnum palustre). Other herbaceous species included turtle head (Chelone glabra), aster (Aster novibelgii), New York aster (Aster novibelgii), and bedstraw (Galium asprellum). The presence of sphagnum moss (Sphagnum palustre), and the distinct mound and pool microtopography in this habitat indicate the water table would be at or near the ground surface throughout the year.

Habitat C:

The next habitat encountered on this transect was an emergent marsh, approximately 60 feet wide dominated by broad-leaved cattail (*Typha latifolia*). A prominent feature of this habitat was the presence of several (est. 5 per 0.25 acre) white pine snags, which were flooded when the containment berm was constructed. This habitat included the following shrubs, speckled alder, common alder (*Sambucus canadensis*), swamp rose (*Rosa palustris*), and arrow-wood. The herbaceous layer of this habitat was dominated by tussock sedge, umbrella sedge (*Cyperus* sp.), arrow-leaved tearthumb (*Polygonum sagittatum*), jewelweed (*Impatiens capensis*), cinnamon fern, and sensitive fern (*Onoclea sensibilis*). The presence of sphagnum moss, and the mound and pool microtopography indicate a high water table (at or near the ground surface throughout the year). This habitat is bordered by the meandering stream channel.

Habitat D:

The last habitat encountered along transect 1 was a white pine (P. strobus) dominated floodplain forest with intermixed oaks (*Quercus* spp.) and maples (*Acer* spp). This habitat is bordered by the meandering stream channel. Vegetation along the stream fringe consists of tussock sedge and various ferns (*Dryopteris* and *Osmunda* spp.). The shrub layer in this habitat is dominated by arrow-wood, and subordinate shrub species present in this habitat include highbush blueberry, sheep laurel, red-osier dogwood (*Cornus stolonifera*), and winterberry.

Transect 2:

Transect 2 is perpendicular to the stream channel, running over the AOC 57 containment berm.

Habitat A:

The first habitat encountered along this transect is a well developed upland forest, co-dominated by white pines, white oaks, and red oaks. The canopy was approximately 60 feet high, with 80 to 85 percent aerial coverage. The shrub canopy is open, and includes low- and highbush blueberry, sheep laurel, clubmoss (Lycopodium sp.). The herbaceous layer is consistent with transect 1 and 3, scattered with interrupted fern (Osmunda claytoniana), cinnamon fern, lady fern, and gold thread. A large percentage of the ground surface in this habitat is covered with a mat of pine needles and partially decomposed oak leaves. The ground surface is sloping towards the steam at approximately a 30 degree angle. The water table in this habitat is well below the ground surface.

Habitat B:

The next habitat encountered along transect 2, was a scrub shrub marsh, approximately 12 to 15 feet wide. Trees in this habitat included white pines grading into red maples. This habitat also included a few scattered wind-throws. The scrub shrub layer consisted mostly of white pine saplings and fetterbush (*Leucothoe racemosa*). The herbaceous layer was dominated by tussock sedge and sphagnum. Subordinate herbaceous species included interrupted fern, gold thread, aster (*Aster novae-angliae*), goldenrods (*Solidago* sp.), turtle head, and purple loosestrife (*Lythrum salicaria*). The ground surface transitioned from relatively flat to slightly mounded and pooled. This habitat seems to be hydrologically affected by the berm, as this area seemed wetter in comparison to the other similar habitats along transects 1 and 3. At the time of the site visit the water table was at the ground surface.

Habitat C:

The next habitat encountered along this transect was a broad-leaved cattail-dominated emergent marsh, approximately 10 to 15 feet wide. This habitat ends abruptly at the stream channel, (4 to 6 feet wide) which is bordered on the opposite side by the containment berm. The shrub layer consisted of an even distribution of arrow-wood, sweet gale, winterberry, red-osier dogwood, swamp birch (Betula pumila), and swamp rose. Subordinate herbaceous species included tussock sedge, meadow rue (Thalictrum polygamum), marsh bedstraw (Galium palustre), aster, purple-leaved willow herb (Epilobium coloratum), and joe-pye weed (Eupatorium dubium). This habitat was distinctly mounded and pooled, and the water table was at the ground surface.

Habitat D:

The next habitat along transect 2 was the AOC 57 containment berm, which is approximately 30 feet wide and 150 feet long. The crest of the berm is approximately 2 feet above the ponded water surface in front of the berm. This habitat is mostly vegetated with shrubs and saplings. The dominant shrub in this habitat is speckled alder, and subordinate shrubs include highbush blueberry, arrow-wood, fetterbush, dogwood, silverberry (*Elaeagnus commutata*), and swamp rose.

Transect 3:

Transect 3 is perpendicular to the stream channel, approximately 300 feet to the northeast (downstream) of the SA57 containment berm.

Habitat A:

The first habitat encountered along transect 3 was a well established upland forest, co-dominated by white pines, white oak, and red oak. The canopy was approximately 60 feet high, with 80 to 85 percent aerial coverage. The shrub sublayer was intermixed with white pine saplings, low- and highbush blueberry, sheep laurel, witch hazel (*Hamamelis virginiana*), nannyberry (*Viburnum-lentago*), and choke cherry. The shrub layer was co-dominated by low- and highbush blueberry, of which there was approximately a 75/25 mix. The herbaceous layer within this habitat was dominated by clubmoss (*Lycopodium carolinianum*), and ferns (*Thelipteris* sp.). The ground was sloping at approximately a 15 degree angle, progressively less than transect 1 and 2. The water table in this habitat is well below the ground surface.

Habitat B: The next habitat encountered along transect 3 was a forested wetland, approximately 35 to 45 feet wide. Red maple trees, approximately 25 to 30 feet high are

sparsely scattered throughout this habitat. The shrub layer is dominated by winterberry. Other shrubs common in this habitat included maleberry (Lyonia ligustrina), paper birch (Betula papyrifera), speckled alder, and highbush blueberry. Herbaceous species common in this habitat included tussock sedge (Carex stricta), interrupted fern, water-smartweed (Polygonum sp.), turtle head, aster, and sphagnum. The ground surface transitioned from slight to distinct mound and pool microtopography, moving from the edge of habitat A towards the stream channel. This habitat may be seasonally flooded and saturated due to the close proximity of the stream channel. At the time of the survey the water table was just below the ground surface.

Habitat C:

The next habitat encountered along transect 3 was a scrub shrub swamp, approximately 250 feet wide. This habitat contained sparsely scattered white pine snags and red maple saplings. The shrub layer was dominated by sweet gale; less dominant species included arrow-wood, winterberry, swamp rose, nannyberry, alder, red-osier dogwood, and highbush blueberry. The herbaceous layer was co-dominated by reed canary grass (*Phalaris arundinacea*) along the stream channel and open areas, and tussock sedge below the shrub layer. Subordinate herbaceous plant species include arrowhead (*Sagitaria latifolia*), yellow pond-lily (*Nuphar variegatum*), pickerelweed (*Peltandra virginica*), duckweed (*Lemna minor*), and bur-reed (*Sparganium* sp.). The stream channel becomes indistinguishable in this habitat. A dendritic flow pattern is formed by water flowing around the mounded areas that are created by shrub, sedge, and grass growth. This habitat is characterized as a large flood plain, with the water at or near the ground surface throughout the year. While conducting the ecological survey, two adult winged odonates were observed in this habitat.

Habitat D:

The final habitat encountered alone transect 3 was forest wetland, approximately 150 feet wide. The wetland was dominated by white pines which had a canopy cover of approximately 50 to 60 percent. Red maple, bigtooth aspen (*Populus grandidentata*), and oak trees were also present in this habitat. The shrub layer in this habitat contained sparsely scattered white pine saplings, nannyberry, choke cherry, arrow-wood, white oak, highbush blueberry, red-osier dogwood, and sheep laurel. The herbaceous layer in this habitat is co-dominated by tussock sedge, clubmoss, and gold thread.

SEDIMENT TOXICITY EVALUATION

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TOXICITY EVALUATION OF SEDIMENT COLLECTED FROM SITES AT FORT DEVENS, MASSACHUSETTS

ABB Environmental Services, Inc.
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SLI Report # 96-3-6419 SLI Study # 13109-925-6131/6132/6133

PROGRAM MANAGER: Ronald C. Biever STUDY DIRECTOR: Arthur E. Putt

Springborn Laboratories, Inc. Environmental Sciences Division 790 Main Street Wareham, Massachusetts 02571

January 10, 1997

FINAL REPORT

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1.0 INTRODUCTION

Decisions regarding the need for remediation and efficacy, of remedial alternatives at sites containing waste materials, often depend on information concerning the environmental risks posed by conditions at the site. As part of the Comprehensive Environmental Response Compensation and Liability Act (CERCLA), remedial alternatives or removal actions for hazardous waste sites should include an environmental impact study. An essential part of the environmental impact study is the assessment of the degree and spatial extent of contamination in sediments and/or soils at the site.

In recognition of these concerns, ABB Environmental Services, Inc. in Wakefield, Massachusetts included a battery of screening evaluation assays with benthic organisms as a part of the environmental impact study. The toxicity of the bulk sediment samples was measured using epibenthic and benthic organisms, *Hyalella azteca* and *Chironomus tentans*, respectively. The bioaccumulation of xenobiotics in the sediments were measured using, a freshwater oligochaete, *Lumbriculus variegatus*.

The objective of this testing program was to evaluate the toxicity of contaminated bulk sediments from nine sites at Fort Devens, Massachusetts and to evaluate the bioaccumulation of xenobiotics from three of the nine sites at Fort Devens. All biological testing was conducted at Springborn Laboratories, Inc., Wareham, Massachusetts. The oligochaete tissue samples were analyzed by ESE Inc., Gainsville, Florida. All original raw data from the biological testing and the final report produced during this study are stored at Springborn.

2.0 MATERIALS AND METHODS

2.1 Test Samples

The toxicity tests were conducted using sediment collected from Fort Devens,

Massachusetts. Approximately 4 liters of sediment from each location were collected by ABB

Environmental Services, Inc. personnel, with an additional 8 liters of sediment collected from the three sites for the bioaccumulation exposure. The nine samples were identified as: ZWD-95-02X, ZWD-95-03X, ZWD-95-06X, 57D-95-04X, 57D-95-05X, 57D-95-06X, 57D-95-07X, 57D-95-08X, and 57D-95-10X. The samples were received at Springborn on 15 September 1995. Three of the six sample containers for sample 57D-95-06X had lost their lids during shipping and sample 57D-95-04X was not included in this shipment. These two samples were recollected by ABB Environmental Services and they were received on 20 September 1995 in tact. Following receipt at Springborn, any samples that were not immediately tested were stored refrigerated at approximately $4 \pm 2^{\circ}$ C. Refrigerated samples were warmed to room temperature before use in the toxicity tests. Prior to use in the toxicity test, all sediment samples were passed through a 2.0 mm stainless steel sieve to remove rocks, debris and large clumps of sediment. In addition, Springborn collected sediment from Strobs Folly Brook, Wareham, MA which was used as a reference control sediment.

2.2 Overlying Water

Laboratory water was used for the overlying water and culture water for the midge, *Chironomus tentans*. The laboratory water was well water which had been supplemented with untreated water from the Town of Wareham, Massachusetts. The laboratory water had a total hardness of 30 mg/L as CaCO₃, a pH range of 7.0 to 7.2, and a specific conductivity within the range of 110 to 130 µmhos/cm.

The laboratory water was fortified to a total hardness of 160 to 180 mg/L as CaCO₃; alkalinity 110 to 130 mg/L as CaCO₃; specific conductance of 400 to 600 µmhos/cm; and a pH of 7.9 to 8.3 for the overlying water and culture water for the amphipod, *Hyalella azteca* (U.S. EPA, 1975).

2.3 Monitoring Environmental Conditions of the Test Systems

Dissolved oxygen concentrations were measured using a Yellow Springs Instrument (YSI) Model #57 dissolved oxygen meter and probe; pH was measured with a Jenco Model

601A pH meter and combination electrode; and daily temperature was measured with a Fisher alcohol thermometer. Total hardness concentration was measured by the EDTA titrimetric method. Total alkalinity concentration was determined by potentiometric titration to an endpoint of pH 4.5 (APHA et. al., 1985). Specific conductance was measured using a YSI Model #33 conductivity meter. The temperature of the test solutions was continuously monitored throughout the study using a Fisher Min/Max thermometer. Light intensity was measured with a General Electric type 217 light meter.

2.4 Subchronic Toxicity Test with Midges

2.4.1 Test Method and Conduct

Test organisms were placed in beakers containing the sediment and clean laboratory overlying water on 25 September 1995 and were incubated under standard conditions until 5 October 1995 (10 days). After the exposure, the surviving organisms were counted and weighed. Sediment toxicity was estimated by comparing the response of exposed organisms in the test sediment with the reference sediment. Procedures used in the subchronic toxicity test with midge followed those described in the Springborn test method entitled "Static-Renewal Partial Life-Cycle Toxicity Test with Midge *Chironomus tentans*" to Meet U.S. EPA Guidelines, Springborn Laboratories Test Method #SED-Ct-101. The procedures described in this test method meet the standard procedures described in the *Methods for Measuring the Toxicity and Bioaccumulation of Sediment-Associated Contaminants with Freshwater Invertebrates* (Ú.S. EPA, 1994). A copy of the test method is an attachment to this report.

2.4.2 Test Organism

Chironomus tentans were obtained from cultures maintained at Springborn. The culture system was maintained under static conditions and consisted of 38-liter glass aquaria, which contained approximately 20 L of laboratory well water, and were maintained at a temperature of 23 ± 2 °C. The culture area received a regulated photoperiod of 16 hours of light and 8 hours of darkness. Light at an intensity of 30 to 100 footcandles was provided at the culture solutions' surface by Durotest Vitalite[®] fluorescent bulbs. The midge cultures

were fed a combination of finely ground flaked fish food suspension (60 mg/mL) prepared at Springborn.

Midge egg masses were obtained from culture vessels by aspirating several adult male and females flies into a 250 mL flask approximately 12 to 14 days prior to test initiation. Egg masses deposited overnight, were removed and placed in a shallow glass pan with laboratory well water. Egg masses hatch occurs approximately 2 to 3 days after deposition. Larvae were fed a flaked fish food suspension (60 mg/mL) and overlying waster was replaced daily, test organisms, 9 to 11 days old (post hatch), were used to initiate the sediment exposures.

2.4.3 Test Procedures

Eight replicate test vessels (300-mL glass beakers) were maintained for each sediment sample and control. Each vessel contained 100 mL (wet weight) of sediment and 175 mL of laboratory water. The resultant sediment layer in each test vessel was 2 cm deep. Each sediment was tested as 100% with no dilutions. The test systems with sediment and water were allowed to sit overnight before introducing the test organisms. The test was initiated when ten midge larvae were introduced to each test vessel. Aeration was provided to each test vessel when dissolved oxygen dropped below 40% of saturation.

The test was conducted in a temperature controlled water bath designed to maintain the temperature of the test solutions at 23 \pm 1 °C. The test area had a photoperiod of 16 hours of light and 8 hours of darkness, with a light intensity range of 30 to 70 footcandles. Lighting was provided by Sylvania Growlux[®] and Cool White[®] fluorescent bulbs.

The overlying water was renewed by adding two volume additions (350 mL total) per day, with a calibrated water-delivery system (Zumwalt *et al.*, 1994). Midge larvae were fed daily. The amount fed ranged between 0.5 mL and 1.5 mL of a suspension of finely ground Tetramin® flaked fish food (4.0 mg/mL), per test vessel, based on the amount of food

collected on the sediment surface. The midge larvae were not fed on Day 8 since sufficient food was available on the sediment surface in the test vessels.

Total hardness, alkalinity, specific conductance, and ammonia were determined at test initiation and test termination in the overlying water from a composite sample from all replicates. The composite sample was taken form 1 to 2 cm from the sediment surface using a pipet. Dissolved oxygen, pH, and temperature were measured in all replicate vessels at test initiation and test termination. Dissolved oxygen, pH, and temperature were monitored daily in at least one alternating replicate during the course of the study. Temperature extremes were recorded daily from readings of a minimum/maximum thermometer place in the water bath. At test initiation and at each subsequent 24-hour interval, biological observations and the physical characteristics of the test solutions were observed and recorded.

Survival was determined at test termination by sieving the sediment from each replicate test vessel to remove the midges for observation. Midge larvae weight was determined by drying the surviving test organisms at 60 ° C for 24-hours then weighing them on a calibrated analytical balance.

2.4.4 Deviations to the Test Method

No deviations to the test methods occurred during this study.

2.5 Subchronic Toxicity Test with Amphipods

2.5.1 Test Method and Conduct

Test organisms were placed in beakers containing the sediment and clean laboratory water on 25 September 1995 and were incubated under standard conditions until 5 October 1995 (10 days). After the exposure, the surviving organisms were counted. Sediment toxicity was estimated by comparing the response of exposed organisms in the test sediment with the reference control sediment. Procedures used in the acute toxicity test with amphipod followed those described in the Springborn test method entitled "Static-Renewal"

Acute Toxicity Test with *Hyallela azteca*" to Meet U.S. EPA Guidelines, Springborn Laboratories Test Method #SED-Ha-121. The procedures described in this test method meet the standard procedures described in the *Methods for Measuring the Toxicity and Bioaccumulation of Sediment-Associated Contaminants with Freshwater Invertebrates* (U.S. EPA, 1994). A copy of the test method is an attachment to this report.

2.5.2 Test Organism

The test organisms, *Hyalella azteca*, used in this study were obtained from Environmental Consulting and Testing. The approximately 1000 amphipods, 7 days old were received on 19 September 1995 and assigned SLI lot number 95A79. The test population was split in two groups of 500 and held for 6 days under static conditions in 9.5-liter aquaria containing 6 L of water. Amphipods were held in fortified laboratory well water and fed a suspension of yeast, cerphyl and trout food suspension (YCT) and supplemented with flake fish food, daily. Temperature was maintained at 23 ± 1°C. The holding area received a regulated photoperiod of 16 hours of light and 8 hours of darkness. Light intensity of 30 to 100 footcandles was provided at the culture solutions' surface by Durotest Vitalite fluorescent bulbs. Amphipods used to initiate the exposure were 13 days old.

2.5.3 Test Procedures

Eight replicate test vessels (300-mL glass beakers) were maintained for each sediment sample and control. Each vessel contained 100 mL (wet weight) of sediment and 175 mL of laboratory water. The resultant sediment layer in each test vessel was 2 cm deep. Each sediment was tested as 100% with no dilutions. The test systems with sediment and water were allowed to sit overnight before introducing the test organisms. The test was initiated when ten amphipods were introduced to each test vessel. Aeration was provided to each test vessel when dissolved oxygen dropped below 40% of saturation.

The test was conducted in a temperature controlled water bath designed to maintain the temperature of the test solutions at 23 \pm 1 °C. The test area had a photoperiod of 16

hours of light and 8 hours of darkness, with a light intensity range of 30 to 70 footcandles. Lighting was provided by Sylvania Growlux[®] and Cool White[®] fluorescent bulbs.

The overlying water was renewed by adding two volume additions (350 mL total) per day, with a calibrated water-delivery system (Zumwalt *et al.*, 1994). The amphipods were fed daily. They were fed 1.0 mL of YCT per test vessel, except on Day 0 when they were fed a 1.5 mL suspension of trout chow, per test vessel.

Total hardness, alkalinity, specific conductance, and ammonia were determined at test initiation and test termination in the overlying water form a composite sample from all replicates. The composite sample was taken form 1 to 2 cm from the sediment surface using a pipet. Dissolved oxygen and temperature were measured in all replicate vessels at test initiation and test termination. Dissolved oxygen and temperature were monitored daily in at least one alternating replicate during the course of the study. Temperature extremes were recorded daily from readings of a minimum/maximum thermometer place in the water bath. At test initiation and at each subsequent 24-hour interval, biological observations and the physical characteristics of the test solutions were observed and recorded.

Survival was determined at test termination by sieving the sediment from each replicate test vessel to remove the amphipods for observation. The amphipod weights were determined by drying the surviving test organisms at 60 ° C for 24-hours then weighing them on analytical balance.

2.5.4 Deviations to the Test Method

The following deviations from the test method occurred in this study.

1. Fortified well water was used for the overlying water rather than well water as stated in the test method. We do not believe this deviation adversely affected the results of this study.

2. There was 64% survival of organisms exposed to the control sediment. This was below the 80% acceptance criteria. This deviation alters statistical analysis of the data, however some inferences about sediment toxicity can still be drawn. These inferences are discussed further in the results section of the report.

2.6 Bioaccumulation Tests with Oligochaetes

2.6.1 Study Method and Conduct

Test organisms were placed in aquaria containing the sediment and laboratory water and were incubated under standard conditions for 28 days. After exposure, the surviving Oligochaetes from each sediment sample and control were placed in 1 liter glass beakers containing approximately 900 mL of laboratory water for a period of 24 hours. This 24 hour period allowed the test organisms to eliminate their gut contents. Following the 24 hour elimination period, all Oligochaetes from each sediment sample and control were frozen then shipped on dry ice for analyses. Procedures used in the bioaccumulation test with oligochaetes followed those described in the Springborn Laboratories test method entitled "Bioaccumulation Test with Oligochaete *Lumbriculus variegatus*", Springborn Laboratories Test Method #SED-Lv-160. The procedures described in this test method follow methodology presented in the *Methods for Measuring the Toxicity and Bioaccumulation of Sediment-Associated Contaminants with Freshwater Invertebrates* (U.S. EPA, 1994).

2.6.2 Test Organism

Lumbriculus variegatus were obtained from cultures maintained at Springborn. Oligochaetes were cultured in 57-liter glass aquaria containing approximately 40 liters of laboratory water and a 3 to 5 cm layer of artificial substrate, which was maintained at a temperature of 22 ± 2 °C. The artificial substrate consists of shredded unbleached paper towel, conditioned in laboratory water. The cultures were maintained under flow through conditions. The culture area received a regulated photoperiod of 16 hours of light and 8 hours of darkness. Light at an intensity of 30 to 100 footcandles was provided at the culture solutions' surface by Durotest Vitalite[®] fluorescent bulbs. The overlying water was

continuously aerated with oil free air. Each culture aquaria was fed, three times per week, a 10 mL suspension of salmon starter (5 mg/mL).

2.6.3 Test Procedures

The test vessels used during this test were 9.5-L aquaria. Three replicate aquaria were maintained for each sediment sample and a control. Each aquaria contained 1 liter of sediment and 4 liters of overlying laboratory water. The resultant sediment layer in each test vessel was 3 cm deep. Each sediment sample was tested as 100% (no dilutions). The test system with sediment and water were allowed to sit overnight before introducing the test organisms. The test was initiated on 19 September 1995, when 100 oligochaetes were introduced to each test aquaria. Aeration was provided to each test vessel throughout the exposure period. The exposure period ended after 28 days on 17 October 1995.

The test was conducted in a temperature controlled water bath designed to maintain the temperature of the test solutions at 23 \pm 1 °C. The test area had a photoperiod of 16 hours of light and 8 hours of darkness, with a light intensity range of 30 to 100 footcandles. Lighting was provided by Durotest Vitalite[®] fluorescent bulbs.

Renewal of the overlying water in each replicate aquaria was performed weekly by carefully siphoning off 75% (approximately 3 liters) of the existing overlying water and gently replacing it with fresh site water. Oligochaetes were not fed during the 28 day exposure. Sufficient organic matter existed (>1.25% organic carbon) in each sample to eliminate feeding during the 28 day study.

At test initiation and at each subsequent 24-hour interval, biological observations and the physical characteristics of the test solutions were observed and recorded. The dissolved oxygen concentration, pH and temperature were measured daily in alternating replicate test aquaria. At test initiation and weekly thereafter, dissolved oxygen, pH and temperature were measured in all replicate aquaria of each test sediment and control. At test initiation and

weekly thereafter until test termination, total hardness, total alkalinity, specific conductivity, and ammonia concentration of overlying water from each test sample and control were measured in alternating replicates.

Surviving biomass was determined at test termination. The oligochaetes were collected by sieving the sediment from each replicate aquaria. Following a 24 hour gut elimination period the oligochaetes were frozen awaiting shipping to the analytical laboratory.

2.6.4 Chemical Analysis of the Xenobiotic(s)

The three exposure oligochaete samples and one control oligochaete sample were frozen and shipped on dry ice to ESE, Inc. on 19 October 1995 via Federal Express overnight service. The chemical analysis of the samples was arranged by ABB Environmental Services.

2.6.5 Deviations to the Test Method

The tissue samples were delivered in a 48-hr period, rather than the 24-hr period stated in the test method. The delay in the delivery was due to a faulty fuel line on a Federal Express jet. The samples were still partially frozen upon arrival at ESE, Inc. We do not believe this deviations adversely affected the results of this study.

2.7 Statistical Analysis

The mean survival and growth of midge larvae and amphipods and total biomass of the oligochaetes from each test sediment and reference control sample were tested for normality and homogeneity of variance using Shapiro-Wilks Test or Chi-Square Test. Since the data passed the two qualifying tests, Dunnett's Test was used to evaluate the results of the mean survival and growth of each test sample for significant adverse effects.

3.0 RESULTS AND DISCUSSION

3.1 Toxicity Tests

3.1.1 Chironomus tentans

A summary of the water quality characteristics of overlying water during the 10-day subchronic tests with *Chironomus tentans* is presented in Table 1. A summary of the biological results from the screening tests with *C. tentans* is presented in Table 2. The midge survival and growth in the laboratory control sample exceeded acceptable test criteria. There were no statistically significant midge survival and growth effects observed in any of the study site samples, compared to the laboratory control data. However, samples ZWD-95-06X, 57D-95-04X, and 57D-95-05X had midge survival of less than 70%.

Comparison of study site samples with a reference sample (57D-95-08X) showed that no significant survival effects were observed in any samples. Midge growth in sample 57D-95-04X was significantly less than the growth observed in the reference sample. All other samples showed no significant growth effects when compared to the reference sample.

3.1.2 Hyalella azteca

A summary of the water quality characteristics of overlying water during the 10-day acute tests with *Hyalella azteca* is presented in Table 3. A summary of the biological results from the screening tests with *H. azteca* is presented in Table 4. The *H. azteca* survival in the laboratory control sample did not meet the acceptable test criteria. The cause of this failure to meet the acceptable criteria is not known. Three of the study site samples had amphipod survival which exceed 80%. All of the organisms used in this study came from the same source and were impartially distributed among the nine study site samples and the laboratory control.

Statistical comparisons of the study site samples against the laboratory control were conducted even though the control did not meet the survival acceptance criteria. Amphipod

survival in sample ZWD-95-06X was significantly less than the control survival. Sample ZWD-95-06X also had the lowest midge survival (Table 2).

Comparison of study site samples with a reference sample (57D-95-08X) showed that amphipod survival in samples ZWD-95-02X and ZWD-95-06X was significantly reduced. No significant growth effects were observed when compared with the reference sample.

3.2 Bioaccumulation Study

A summary of the water quality characteristics of overlying water during the 28-day exposure with *Lumbriculus variegatus* is presented in Table 5. The mean oligochaete biomass from each sample at the termination is presented in Table 6. Results of the chemical analysis of the oligochaete tissue and sediment are presented in Table 7.

Tetrachloro-m-xylene and decachlorobiphenyl were found in the three study site tissue samples and the laboratory control. Aldrin was found in two of the study site tissue samples (57D-95-08X and 57D-95-06X) and the laboratory control. None of the analities found in the oligochaete tissue were measured in the sediments from the study site. There was an unusual correlation between the concentration of the three analities found in the oligochaete tissue samples and the order of the four tissue samples. The control tissue had the highest concentration of all three analities, sample 57D-95-08X had the second highest concentration of all three analities, sample 57D-95-06X had the third highest concentration of all three analities and sample 57D-95-05X had the lowest concentration of all three analities. This trend suggests that either the quantification limits of each compound for the small mass of tissue were unreliable, or that there was some sort of systematic sample contamination. In either event, since the three analities were not found in the sediment from the study site, the tissue concentrations appear to be artifactual.

4.0 REFERENCES

- APHA, AWWA, WPCF. 1985. Standard Methods for the Examination of Water and Wastewater. 16th Edition, Washington, DC, 1268 pp.
- U.S. Environmental Protection Agency. 1994. *Methods for Measuring the Toxicity and Bioaccumulation of Sediment-Associated Contaminants with Freshwater Invertebrates*. EPA/600/R-94/024.
- Zumwalt, D.C., F.J. Dwyer, I.E. Greer, and C.G. Ingersoll. 1994. A water-renewal system that accurately delivers small volumes of water to exposure chambers. *Environmental Toxicology and Chemistry*. 13:1311-1314.

5.0 TABLES

Table 1. Water quality parameters (dissolved oxygen, pH, temperature, total alkalinity, total hardness, specific conductivity) measured in the overlying water during the 10-day subchronic toxicity tests with *Chironomus tentans*.

Sample		ssolved Oxygen pH (mg/L)		рН		Ammonia (mg/L as N)	
Identification -	Day 0	Day 10	Day 0	Day 10	Day 0	Day 10	
Control	8.1-8.3	4.2-4.8	6.8	6.3-6.6	0.58	0.63	
ZWD-95-02X	8.7	3.9-7.2	7.0-7.1	6.5-6.6	0.21	0.80	
ZWD-95-03X	8.6-8.7	4.6-7.3	7.0	6.4-6.5	0.0	0.85	
ZWD-95-06X	8.7-8.8	5.6-7.3	7.1	6.1-6.7	0.0	0.87	
57D-95-04X	8.0-8.3	3.1-6.8	6.8-6.9	6.4-6.5	0.16	0.87	
57D-95-05X	7.4-7.6	5.3-6.9	6.7-6.8	6.4-6.5	0.08	0.70	
57D-95-06X	7.9-8.3	5.8-7.2	6.8-6.9	6.4-6.5	0.16	0.45	
57D-95-07X	7.5-7.9	1.4-6.9	7.0	6.1-6.5	0.28	0.72	
57D-95-08X	8.0-8.2	4.6-7.1	6.9-7.0	6.4-6.5	0.34	0.79	
57D-95-10X	7.5-7.9	4.4-7.4	6.8-6.9	6.5	0.30	0.68	

	Alka	linity	Hardness		s Conductivity	
Sample	(mg/L a	s CaCO ₃)	(mg/L a	s CaCO ₃)	(µmh	os/cm)
Identification	Day 0	Day 10	Day 0	Day 10	Day 0	Day 10
Control	20	20	44	32	160	110
ZWD-95-02X	22	30	44	40	160	120
ZWD-95-03X	22	26	40	36	170	110
ZWD-95-06X	20	32	40	40	170	120
57D-95-04X	20	22	36	32	160	110
57D-95-05X	22	28	40	40	170	120
57D-95-06X	20	18	44	40	160	110
57D-95-07X	24	26	44	48	170	130
57D-95-08X	24	24	44	40	160	120
57D-95-10X	22	26	44	36	170	120

Table 2. Survival and average dry weights of *Chironomus tentans* at the termination of the 10-day subchronic toxicity tests.

Sample	Mean Percent Survival	Mean Dry Weight in mg
Identification	(Standard Deviation)	(Standard Deviation)
Control	74(19)	1.70(0.32)
ZWD-95-02X	75(15)	2.24(0.85)
ZWD-95-03X	88(14)	2.94(0.67)
ZWD-95-06X	60(19)	2.41(0.93)
57D-95-04X	65(29)	1.36(0.30)ª
57D-95-05X	64(29)	2.00(0.48)
57D-95-06X	90(8)	1.80(0.19)
57D-95-07X	71(24)	2.27(0.67)
57D-95-08X	84(12)	1.81(0.30)
57D-95-10X	83(12)	1.75(0.33)

Midge growth in this sample was significantly less than the reference sample (57D-95-08X).

Table 3. Water quality parameters (dissolved oxygen, pH, temperature, total alkalinity, total hardness, specific conductivity) measured in the overlying water during the 10-day acute toxicity tests with *Hyalella azteca*.

Sample		Dissolved Oxygen (mg/L)		рН		Ammonia (mg/L as N)	
Identification	Day 0	Day 10	Day 0	Day 10	Day 0	Day 10	
Control	6.8-7.1	5.9-6.2	7.3-7.4	7.5-7.7	0.72	0.36	
ZWD-95-02X	7.4-7.8	5.5-6.4	7.6-7.8	7.4-7.7	0.28	0.41	
ZWD-95-03X	7.5-7.7	5.4-7.8	7.6-7.7	7.5-7.8	0.0	0.21	
ZWD-95-06X	7.2-7.5	5.0-6.4	7.6-7.7	7.2-7.6	0.02	0.33	
57D-95-04X	7.5-7.8	5.6-6.5	7.5-7.6	7.4-7.7	0.13	0.10	
57D-95-05X	6.2-6.6	4.7-6.0	7.3-7.4	7.4-7.6	0.07	0.23	
57D-95-06X	6.5-6.6	5.5-6.2	7.3-7.4	7.3-7.7	0.25	0.32	
57D-95-07X	6.1-6.6	4.8-6.2	7.6-7.7	7.4-7.7	0.32	0.20	
57D-95-08X	6.3-6.5	5.4-6.5	7.5	7.4-7.8	0.42	0.38	
57D-95-10X	6.5-7.7	5.1-6.3	7.4-7.6	7.6-7.8	0.28	0.21	

. 1	Alka	linity	Hard	iness	Condi	uctivity
Sample	(mg/L as	s (CaCO ₃)	(mg/L as	s (CaCO ₃)	(µmh	os/cm)
Identification	Day 0	Day 10	Day 0	Day 10	Day 0	Day 10
Control	98	112	156	164	500	500
ZWD-95-02X	124	114	168	176	500	500
ZWD-95-03X	110	112	168	172	450	500
ZWD-95-06X	116	112	168	172	500	500
57D-95-04X	104	106	160	160	500	500
57D-95-05X	106	124	164	180	500	500
57D-95-06X	102	106	156	168	500	500
57D-95-07X	112	120	172	172	500	500
57D-95-08X	116	116	168	172	500	500
57D-95-10X	114	112	168	172	500	500

Table 4. Survival of *Hyalella azteca* at the termination of the 10-day acute toxicity tests.

Sample	Mean Percent Survival	Mean Dry Weight in mg
Identification	(Standard Deviation)	(Standard Deviation)
Control	64(18) ^a	0.10(0.05)
ZWD-95-02X	55(24) ^b	0.15(0.07)
ZWD-95-03X	66(18)	0.10(0.05)
ZWD-95-06X	36(23) ^{b, c}	0.11(0.07)
57D-95-04X	83(7)	0.08(0.01)
57D-95-05X	70(19)	0.16(0.05)
57D-95-06X	84(9)	0.08(0.03)
57D-95-07X	74(7)	0.11(0.04)
57D-95-08X	80(21)	0.10(0.03)
57D-95-10X	71(18)	0.11(0.06)

^a The control survival did not meet the acceptance criteria of 80%.

Amphipod survival in this sample was significantly less than the reference sample (57D-95-08X).

^c Amphipod survival in this sample was significantly less than the control.

Table 5. Water quality parameters (dissolved oxygen, pH, temperature, total alkalinity, total hardness, specific conductivity) measured in the overlying water during the 28-day exposure with *Lumbriculus variegatus*.

	Dissolved Oxygen	рН	Ammonia
Sample _	(mg/L)		(mg/L as N)
Identification	Day 0-28	Day 0-28	Day 0-28
Control	6.4-8.6	6.5-7.2	0.26-0.71
57D-95-05X	6.4-8.1	6.9-7.6	0.47-0.79
57D-95-06X	6.9-8.2	7.1-7.5	0.50-0.92
57D-95-08X	6.9-8.3	7.2-7.6	0.48-0.68

Sample	Alkalinity (mg/L as CaCO ₃)	Hardness (mg/L as CaCO ₃)	Conductivity (µmhos/cm) Day 0-28	
Identification	Day 0-28	Day 0-28		
Control	16-38	24-56	90-220	
57D-95-05X	22-82	32-88	110-300	
57D-95-06X	20-63	40-76	140-250	
57D-95-08X	24-50	44-80	150-250	

Table 6. Mean biomass per aquarium of *Lumbriculus variegatus* at the termination of the 28-day exposure.

Sample	Mean Biomass (g)/Aquarium		
Identification	(Standard Deviation)		
Control	1.37(0.09)		
57D-95-05X	1.43(0.11)		
57D-95-06X	1.52(0.41)		
57D-95-08X	1.18(0.25)		

Concentration of analities measured in sediment and tissue of Lumbriculus variegatus after the 28-day exposure.

Sample	Sample	Concentration (µg/kg) Wet Weight		
Number	Туре	Aldrin	Tetrachloro-m-xylene	Decachlorobipheny I
Control	tissue	39.7	2850	3380
57D-95-08X	tissue	21.6	919	1130
57D-95-06X	tissue	16.6	751	926
57D-95-05X	tissue	<6.67	454	558
Control	sediment	NA	NA	NA
57D-95-08X	sediment	ND	ND	ND
57D-95-06X	sediment	ND	ND	ND
57D-95-05X	sediment	ND	ND	ND

NA = not analyzed ND = not detected

6.0 SIGNATURES AND APPROVAL

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